

Indoor Air Quality and Vapor Intrusion Assessment: Report of Second Sampling Round Results

**Commercial Property, Tax ID 26/ 02/ 06
Wells G&H Superfund Site
Woburn, Massachusetts**

August 2011

Submitted to:

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1. Introduction

On behalf of UniFirst Corporation (UniFirst), ARCADIS has prepared this Indoor Air Quality and Vapor Intrusion Assessment: Report of Second Sampling Round Results for sampling conducted on June 18, 2011 at the commercial property in Woburn, Massachusetts identified in the tax assessors' records as Woburn Parcel Number 26/ 02/ 06 (the Commercial Property). ARCADIS conducted sub-slab soil vapor, indoor ambient air, and outdoor ambient air sampling at the commercial property during June 2011. All work was completed in accordance with the *Vapor Intrusion Assessment Work Plan (Work Plan)* approved by the U.S. Environmental Protection Agency (USEPA) on February 17, 2011 (ARCADIS 2011a).

As stated in the *Work Plan*, USEPA requested that sub-slab soil vapor, indoor air, and ambient air samples be collected from certain residential and commercial properties located on Olympia Avenue, Oregon Avenue, and Marietta Street (Study Area). The Commercial Property is one of the properties that USEPA identified for study. The *Work Plan* was submitted to and approved by USEPA to establish the sampling methods and procedures to be followed. The objectives of the sampling were to:

- Measure concentrations of volatile organic compounds (VOCs) in sub-slab soil vapor and indoor air at each property identified for study by USEPA in the Study Area; and
- Measure concentrations of VOCs in outdoor air near these properties to evaluate atmospheric conditions at the time of indoor air sample collection.

The results of the second round of vapor intrusion sampling, sampling methodology, a discussion of the sampling results including a preliminary human health risk evaluation, and recommendations for future actions are provided below. A comparison of results from both the first sampling round (March 12, 2011) and the current (second) sampling round (June 18, 2011) is also presented.

2. Sampling Program

Consistent with the *Work Plan* (ARCADIS 2011a), ARCADIS collected a second round of sub-slab soil vapor, indoor air, and ambient air samples from the Commercial Property on June 18, 2011. Specific sampling methodologies were consistent with the *Indoor Air Quality and Vapor Intrusion Assessment Scope of*

Work – Revision 2 (SOW) (JCO 2010a) and the Quality Assurance Project Plan – Revision 1 (QAPP) (JCO 2010b) and the previous sampling round. Pre-sampling activities, sampling methodologies, and sample locations are described below. Sample logs are provided in Appendix A.

2.1 Pre-Sampling Activities

Prior to sampling, ARCADIS, in coordination with the USEPA, was granted access to the Commercial Property from the current property owner and tenant. ARCADIS conducted a site reconnaissance to identify the building and foundation condition, building materials, heating, ventilation, and air conditioning (HVAC) operation, and potential preferential vapor migration pathways (i.e., sump pump, floor drains, cracks, etc.). A product inventory was completed to list items observed in the portion of the Commercial Property where indoor air sampling was conducted that may contain VOCs that could potentially interfere with sample results. Because the portion of the Commercial Property that was the subject of the study is used as a day care center, many cleaning products were noted during the building survey, including the following:

- Cleaning and disinfecting products that contain bleach. Products included Chlorox® cleaning wipes, Windex®, and glass wipes.
- Rust-Oleum® products that contained toluene, xylene, and acetone.

In addition, one worker is known to smoke outside the building.

All products identified in the portion of the Commercial Property to be sampled were containerized and removed from the building approximately 36-hours prior to sampling. The daycare center encompasses only a portion of the building on the Commercial Property; the survey did not include other areas of the Building. The building survey and product inventory can be found in Appendix B.

2.2 Indoor Ambient Air Assessment

On June 18, 2011 indoor air samples were collected from three locations inside the Commercial Property. All indoor air samples were co-located with the installed sub-slab soil vapor points and were consistent with the previous round of sampling. One duplicate indoor air sample was also collected from the Commercial Property as a quality control measure.

Sample methods were consistent with the *SOW* (JCO 2010a) and *QAPP* (JCO 2010b). Samples were collected from the breathing zone (3 to 4 feet above ground surface) above each sub-slab soil vapor location. To avoid any cross contamination issues with potential vapors under the floor slab, indoor air samples were collected prior to sub-slab soil vapor samples. To ensure a reasonable worst case scenario, indoor air sampling was conducted with all exterior building doors closed to avoid any dilution with outside air.

Samples were collected over a 12-hour period in individually certified six-liter passivated sample canisters provided by Alpha Analytical, Inc. of Mansfield, Massachusetts (Alpha), a National Environmental Laboratory Accreditation Conference (NELAC) (E87814) certified laboratory. Canisters were analyzed for VOCs by USEPA Method TO-15 featuring selective ion monitoring (SIM). Detailed sample collection methods are included in the *SOW* (JCO 2010a) and in SOP-JCO-063 contained in the *QAPP* (JCO 2010b). Sample logs from indoor air sampling are included in Appendix A.

2.3 Outdoor Ambient Air Assessment

On June 18, 2011, one ambient outdoor air sample was collected from an upwind location and one ambient outdoor air sample was collected from a downwind location outside the Commercial Property using the same methods as described for indoor air samples. Samples were collected to understand what contribution the ambient environment may have on indoor air samples collected from inside the building. Sample locations are presented in Figure 1. Outdoor ambient air and indoor air samples were collected over approximately the same 12-hour time period with the outdoor samples being started immediately prior to the indoor air samples. Sample logs from ambient air sampling are included in Appendix A.

2.4 Sub-Slab Soil Vapor Assessment

Three permanent sub-slab soil vapor sample points were installed at the Commercial Property on March 11, 2011 (Figure 1). Installation methods for the three points were previously reported in the *Work Plan* and the Indoor Air Quality and Vapor Intrusion Assessment (ARCADIS 2011a, b).

At the completion of the indoor air sampling on June 18, 2011, sub-slab soil vapor samples were collected from three locations in the commercial building. The integrity of each sample port was tested using a helium tracer test. These methods were

presented in the *Work Plan* (ARCADIS 2011). One duplicate sample was collected as a quality control measure utilizing a decontaminated stainless steel “T” fitting provided by the laboratory.

Prior to sampling, three volumes of the sample tubing were purged utilizing a low-flow pump to remove any ambient air from the sampling train. Detailed methods for sampling are included in SOP-JCO-062 contained in the *QAPP* (JCO 2010b). Samples were collected over a 30-minute period in individually certified six-liter passivated sample canisters provided by Alpha. Canisters were analyzed for VOCs by USEPA Method TO-15 featuring SIM. Sample logs from sub-slab soil vapor sampling are included in Appendix A.

Upon the completion of the second round of sub-slab soil vapor sampling (June 18, 2011) the sub-slab soil vapor points were removed. Points were removed from the floor slab using a chisel, hammer, and pry-bar. After removing each sampling point, the drilled hole was vacuumed out and filled with hydraulic cement. The overlying carpeting was glued back down using low-VOC carpet adhesive.

2.5 Data Synthesis and Reporting

Analytical data packages generated by the laboratory were validated by Phoenix Chemistry Services according to national guidelines for tier III data validation as described in the *SOW* (JCO 2010a) and *QAPP* (JCO 2010b). The data review included: field documentation, proper holding times, proper chain-of-custody documentation, achievement of target reporting limits, acceptable laboratory calibrations and quality control parameters, and representativeness of duplicate results.

Findings of the validation effort resulted in the following qualifications of sample results:

- Results for 1,3-butadiene, methyl tert-butyl ether (MTBE), toluene, ethylbenzene, and naphthalene in all samples were qualified as estimated (J, UJ).

Quality control results, including any revisions or qualifiers deemed necessary, are included in Tables 1 and 2. The data validation report is included in Appendix C. The laboratory analytical data package is included in Appendix D.

3. Results and Discussion

This section presents results for indoor air, outdoor ambient air, and sub-slab soil vapor samples collected from the Commercial Property including a summary evaluation of potential human health risks. A copy of the complete Preliminary Human Health Risk Evaluation can be found in Appendix E.

3.1 Indoor and Outdoor Ambient Air Sampling Results

Analytical data for indoor and outdoor ambient air samples are presented on Table 1. The following constituents were detected in all indoor air samples: 1,2,4-trimethylbenzene, 1,3-butadiene, 1,4-dichlorobenzene, benzene, bromodichloromethane, carbon tetrachloride, chloroform, ethylbenzene, methylene chloride, naphthalene, tetrachloroethene (PCE), toluene, and xylenes. 1,1,1-Trichloroethane was detected in sample IA-1, but was not detected in the other two indoor air sample locations. 1,2-Dichloroethane was detected in sample IA-1 and IA-3 only. Detected concentrations of these constituents are presented in Table 1.

The following constituents were detected in both of the outdoor ambient air samples: 1,2,4-trimethylbenzene, carbon tetrachloride, methylene chloride, naphthalene, toluene, and xylenes. Ethylbenzene was detected in sample AA-1 only. Detected concentrations of these constituents are presented in Table 1.

3.2 Sub-Slab Soil Vapor Sampling Results

Analytical data for sub-slab soil vapor are presented in Table 2. The following constituents were detected in all sub-slab soil vapor samples: 1,1,1-trichloroethane, chloroform, PCE, and trichloroethene (TCE). Bromodichloromethane was detected in sample location SS-1 and SS-3, but not in sample SS-2. At location SS-3 carbon tetrachloride was detected. 1,1-Dichloroethane, 1,2,4-trimethylbenzene, cis-1,2-dichloroethene, methyl tert butyl ether, methylene chloride, toluene, trans-1,2-dichloroethene were detected in sample SS-1 but not in the other samples. The full list of detected constituents and their concentrations are presented in Table 2.

3.3 Evaluation of Indoor Air and Sub-Slab Soil Vapor Results

The data results for indoor air and sub-slab soil vapor were evaluated together to determine if indoor air samples were associated with a potential background source. As a first step, attenuation factors (AFs) were calculated to evaluate if chemicals

present in indoor air are potentially associated with sub-slab soil vapor levels, or if chemicals may be attributable to background sources. The AF is the ratio of indoor air to sub-slab soil vapor results and was calculated when a constituent was detected in both indoor air and sub-slab soil vapor. AFs close to or greater than one indicate that indoor air concentrations are equal to or higher than sub-slab soil vapor concentrations and therefore, that a background source likely is present. Of the 15 chemicals detected in indoor air, AFs could be calculated for eight chemicals. The following three chemicals had AFs greater than one: 1,2,4-trimethylbenzene, carbon tetrachloride, and toluene. As a result, the presence of these constituents in indoor air is attributable to background sources and not soil vapor intrusion. The calculation of AFs is presented in Table 2 of Appendix E.

Second, the data were evaluated to identify constituents that were detected in indoor air, but not in sub-slab soil vapor. These results indicate a background material is the only source of the detected indoor air concentrations. The following constituents were identified as having background sources based on this criterion: 1,2-dichloroethane, 1,3-butadiene, 1,4-dichlorobenzene, benzene, ethylbenzene, naphthalene, and xylenes.

Third, the results of indoor air and outdoor air samples were compared. Carbon tetrachloride, methylene chloride, and naphthalene were measured at similar concentrations in both outdoor and indoor air. These results indicate background sources are present in outdoor ambient air.

Only five constituents were detected in indoor air at a lower concentration compared to the co-located sub-slab soil vapor sample. For these constituents (1,1,1-trichloroethane, bromodichloromethane, chloroform, methylene chloride, and PCE), sub-slab soil vapor may be a contributing source of detections in indoor air. For bromodichloromethane, chloroform, and methylene chloride, AFs were between 0.1 and 0.4, indicating that background sources are present in the building. In all cases, however, the low concentrations detected are consistent with those typically measured in residential properties.

1,1,1-Trichloroethane was detected in samples IA-1 and IA-2 at $0.109 \mu\text{g}/\text{m}^3$, which falls right at the detection limit for the constituent. These results are consistent with background sources throughout the United States and are below the MADEP TV for 1,1,1-trichloroethane ($3.0 \mu\text{g}/\text{m}^3$). USEPA's indoor air background database reported a 50th percentile value of $1.8 \mu\text{g}/\text{m}^3$, a 75th percentile value of $2.6 \mu\text{g}/\text{m}^3$, and a 90th percentile value of $3.1 \mu\text{g}/\text{m}^3$ (Dawson 2008).

Bromodichloromethane was detected in all three indoor air samples with an average concentration of $0.32 \mu\text{g}/\text{m}^3$. These results are slightly above the Massachusetts Department of Environmental Protection (MADEP) Threshold Value (TV) for bromodichloromethane ($0.14 \mu\text{g}/\text{m}^3$). Bromodichloromethane is a component of chlorinated drinking water (<http://www.atsdr.cdc.gov/ToxProfiles/tp129.pdf>). Based on the high vapor pressure of bromodichloromethane, it volatilizes quickly and is most often encountered in air (<http://www.atsdr.cdc.gov/ToxProfiles/tp129.pdf>). This constituent is not in USEPA's indoor air database but is documented to exist at concentrations below $1.4 \mu\text{g}/\text{m}^3$ in indoor air due to its usage as a chlorinator in tap water (<http://www.atsdr.cdc.gov/ToxProfiles/tp129.pdf>). In a study of residential properties, bromodichloromethane was detected with a median concentration of $0.32 \mu\text{g}/\text{m}^3$ (http://www.envirogroup.com/publications/brdiclme-chloroform_paper_v2_8_23_04_publication_eleven.pdf).

Chloroform was detected in indoor air samples at concentrations between 4.79 and $5.57 \mu\text{g}/\text{m}^3$. These results are consistent with background sources measured in indoor air throughout the United States. Chlorine is commonly used to treat drinking water, swimming pools, spas, and municipal wastewater, and chlorinated tap water is a known source of chloroform to indoor air (<http://www.epa.gov/ttnatw01/hlthef/chlorofo.html>). USEPA's indoor air background database reported a 50th percentile value of $1.0 \mu\text{g}/\text{m}^3$, a 75th percentile value of $2.4 \mu\text{g}/\text{m}^3$, and a 90th percentile value of $4.1 \mu\text{g}/\text{m}^3$ (Dawson 2008). Notwithstanding the incidence of chloroform in indoor air as a result of widespread uses of chlorine as a disinfectant, MADEP TV for chloroform is $1.9 \mu\text{g}/\text{m}^3$. Multiple background sources were identified in disinfecting products used within the building itself. These included products containing bleach, which are regularly used at the daycare center to disinfect toys, tables, and other surfaces.

Methylene chloride was detected in indoor air samples at concentrations between 2.89 and $6.81 \mu\text{g}/\text{m}^3$. These results are consistent with background sources throughout the United States and are mostly below the MADEP TV for methylene chloride ($5.0 \mu\text{g}/\text{m}^3$). The average methylene chloride concentration detected in indoor air was $4.28 \mu\text{g}/\text{m}^3$ with only sample IA-1 exceeding the MADEP TV (IA-1 = $6.81 \mu\text{g}/\text{m}^3$). USEPA's indoor air background database reported a 50th percentile value of $1.10 \mu\text{g}/\text{m}^3$, a 75th percentile value of $3.2 \mu\text{g}/\text{m}^3$, and a 90th percentile value of $11 \mu\text{g}/\text{m}^3$ (Dawson 2008).

PCE was detected in indoor air samples at concentrations between 1.09 and $1.23 \mu\text{g}/\text{m}^3$. These results are consistent with background sources throughout the United

States and are below the MADEP TV for PCE ($1.4 \mu\text{g}/\text{m}^3$). USEPA's indoor air background database reported a 50th percentile value of $0.7 \mu\text{g}/\text{m}^3$, a 75th percentile value of $1.4 \mu\text{g}/\text{m}^3$, and a 90th percentile value of $3.8 \mu\text{g}/\text{m}^3$ (Dawson 2008).

According to MADEP, when constituents of concern are measured in indoor air at levels that are below TVs, it can reasonably be concluded that a complete vapor intrusion pathway does not exist.

3.4 Commercial Property Human Health Risk Evaluation

Preliminary human health risk calculations were performed using the June 18, 2011 validated indoor air data and a combined data set (i.e., average indoor air concentrations) from the March 2011 and June 2011 sampling events. The Preliminary Human Health Risk Evaluation Report and supporting calculations can be found in Appendix E. The conclusions from that report are summarized below.

Potential risks from inhalation of constituents detected in indoor air were calculated assuming a worker is present on the Commercial Property for 11 hours a day, 250 days per year, for 25 years. Such exposure assumptions are more conservative than a child who would be present at the Commercial Property for a period of 11 hours per day, 250 days per year, for only 7 years (i.e., the maximum possible duration assuming the child entered on the first day and exited on the last day of day care eligibility). For each constituent, the exposure point concentration in indoor air is equal to the average concentration of the three indoor air results from the current sampling round.

To evaluate potential risks over the initial (March 12, 2011) and current (June 18, 2011) sampling events, risks were calculated considering chemicals detected in indoor air from both sampling rounds. Data from March 12, 2011 were presented in the Indoor Air Quality and Vapor Intrusion Assessment: Report of Results submitted to USEPA on April 28, 2011 (ARCADIS 2011b). Any constituent that was detected in either the March or June sampling events in indoor air was included in the combined risk calculation. Risks were estimated using the average concentration from both sampling rounds. Risks associated with both data sets are referred to as "Combined Results" below.

The estimated total cancer risk associated with long term worker exposure to indoor air from the June 18, 2011 sampling round is 2×10^{-5} , primarily due to the presence of chloroform and benzene (70% of risk). As explained above, the concentrations of

chloroform measured in indoor air very likely reflect observed and other common uses of chlorine as a disinfectant. Benzene was only detected in indoor air. Therefore, the majority of risk associated with these chemicals is likely from background sources. Excluding chloroform and benzene, all other chemical-specific risks including those associated with background sources, do not exceed a 2×10^{-6} risk level for the current sampling round. Estimated cancer risk from PCE is equal to 8×10^{-7} .

The estimated total cancer risk associated with long term worker exposure to indoor air using the combined data set is 2×10^{-5} , primarily due to the presence of chloroform and benzene (71% of risk). The majority of risk associated with chloroform is likely from background sources. Benzene was only detected in indoor air. Excluding chloroform, all other chemical-specific risks, including those associated with PCE, are below a 2×10^{-6} risk level for the combined data set. Estimated cancer risk from PCE is equal to 7×10^{-7} .

4. Summary and Conclusions

The potential carcinogenic risk level estimated for a worker exposed for 25 years and 11 hours per day to the low levels of PCE (from the June 18, 2011 sampling event) at the Commercial Property is 8×10^{-7} . This represents a level of risk that is below even the most conservative end of USEPA's risk range for Superfund sites. The estimated total risk, including exposure to other constituents in the building originating from background sources is 2×10^{-5} , primarily due to chloroform and benzene. As noted above, estimated cancer risks for PCE are similar for this sampling event (June 2011) (8×10^{-7}) and the combined data results (7×10^{-7}). This is also true for the overall risk calculations; the second sampling round risks and combined risks are both equal to 2×10^{-5} .

The low concentrations of PCE detected in the Commercial Property are consistent with those typically measured in residences, as reported by USEPA and MADEP. Measured PCE concentrations from both March 12 and June 18, 2011 are below the MADEP TV of $1.4 \mu\text{g}/\text{m}^3$. According to MADEP, when constituents of concern are measured in indoor air at levels that are below TVs, it can reasonably be concluded that a complete vapor intrusion pathway does not exist.

5. Recommendations

The two rounds of sub-slab soil vapor and indoor air data collected in March and June 2011 confirm that risks to on-site commercial workers and day care children are within USEPA's risk range for Superfund sites. Estimated risks from exposure to constituents detected in indoor air are due primarily to background sources in the building, including various products containing chloroform. Estimated risks from exposure to PCE are less than USEPA's 1×10^{-6} risk threshold. Moreover, PCE concentrations in indoor air are less than background values including the MADEP TV of $1.4 \mu\text{g}/\text{m}^3$. Based on these findings, no further action is recommended to address the vapor intrusion pathway at the Commercial Property.

6. References

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Table 1. Indoor and Ambient Air Sampling Results - Commercial Property

Sample Name:		IA-1	IA-2	IA-3	AA-1	AA-2
Date Collected:	Units	6/18/2011	6/18/2011	6/18/2011	6/18/2011	6/18/2011
1,1,1-Trichloroethane	µg/m ³	0.109	0.109 [0.109 U]	0.109 U	0.109 U	0.109 U
1,1,2-Trichloroethane	µg/m ³	0.109 U	0.109 U [0.109 U]	0.109 U	0.109 U	0.109 U
1,1-Dichloroethane	µg/m ³	0.081 U	0.081 U [0.081 U]	0.081 U	0.081 U	0.081 U
1,1-Dichloroethene	µg/m ³	0.079 U	0.079 U [0.079 U]	0.079 U	0.079 U	0.079 U
1,2,4-Trimethylbenzene	µg/m ³	2.13	2.3 [2.67]	2.69	0.241	0.142
1,2-Dibromoethane	µg/m ³	0.154 U	0.154 U [0.154 U]	0.154 U	0.154 U	0.154 U
1,2-Dichloroethane	µg/m ³	0.308	0.081 U [0.081 U]	0.368	0.081 U	0.081 U
1,2-Dichloropropane	µg/m ³	0.092 U	0.092 U [0.092 U]	0.092 U	0.092 U	0.092 U
1,3-Butadiene	µg/m ³	0.077 J	0.1 J [0.1 J]	0.077 J	0.044 UJ	0.044 UJ
1,3-Dichlorobenzene	µg/m ³	0.12 U	0.12 U [0.12 U]	0.12 U	0.12 U	0.12 U
1,4-Dichlorobenzene	µg/m ³	0.18	0.168 [0.186]	0.168	0.12 U	0.12 U
Benzene	µg/m ³	3.18	3.19 [3.14]	3.07	0.224 U	0.224 U
Bromodichloromethane	µg/m ³	0.315	0.328 [0.315]	0.315	0.134 U	0.134 U
Bromoform	µg/m ³	0.207 U	0.207 U [0.207 U]	0.207 U	0.207 U	0.207 U
Carbon Tetrachloride	µg/m ³	0.704	0.679 [0.66]	0.679	0.447	0.459
Chlorobenzene	µg/m ³	0.092 U	0.092 U [0.092 U]	0.092 U	0.092 U	0.092 U
Chloroform	µg/m ³	5.27	5.13 [4.79]	5.57	0.098 U	0.098 U
cis-1,2-Dichloroethene	µg/m ³	0.079 U	0.079 U [0.079 U]	0.079 U	0.079 U	0.079 U
Ethylbenzene	µg/m ³	3.47 J	3.56 J [3.68 J]	3.57 J	0.091 J	0.087 UJ
Isopropylbenzene	µg/m ³	2.46 U	2.46 U [2.46 U]	2.46 U	2.46 U	2.46 U
Methyl tert butyl ether	µg/m ³	0.072 UJ	0.072 UJ [0.072 UJ]	0.072 UJ	0.072 UJ	0.072 UJ
Methylene Chloride	µg/m ³	6.81	3.26 [3]	2.89	3.29	3.96
Naphthalene	µg/m ³	0.603 J	0.587 J [0.514 J]	0.603 J	2.86 J	0.157 J
Tetrachloroethene	µg/m ³	1.09	1.13 [1.23]	1.19	0.136 U	0.136 U
Toluene	µg/m ³	27.9 J	29 J [27.2 J]	27 J	0.637 J	0.724 J
trans-1,2-Dichloroethene	µg/m ³	0.079 U	0.079 U [0.079 U]	0.079 U	0.079 U	0.079 U
trans-1,3-Dichloropropane	µg/m ³	0.091 U	0.091 U [0.091 U]	0.091 U	0.091 U	0.091 U
Trichloroethene	µg/m ³	0.107 U	0.107 U [0.107 U]	0.107 U	0.107 U	0.107 U
Vinyl Chloride	µg/m ³	0.051 U	0.051 U [0.051 U]	0.051 U	0.051 U	0.051 U
Xylenes	µg/m ³	18.8	19 [19.9]	19.3	0.33	0.304

Notes:

U - Constituent not detected

J - Indicates an estimated value

 µg/m³ - micrograms per cubic meter

[0.109 U] - duplicate results presented in brackets

Table 2. Sub-Slab Soil Vapor Sampling Results - Commercial Property

Sample Name:		SS-1	SS-2	SS-3
Date Collected:	Units	6/18/2011	6/18/2011	6/18/2011
1,1,1-Trichloroethane	µg/m ³	8.4 [7.69]	38.2	12.1
1,1,2-Trichloroethane	µg/m ³	0.218 U [0.6 U]	1.09 U	0.218 U
1,1-Dichloroethane	µg/m ³	0.518 [0.445 U]	0.809 U	0.162 U
1,1-Dichloroethene	µg/m ³	0.158 U [0.436 U]	0.793 U	0.158 U
1,2,4-Trimethylbenzene	µg/m ³	0.197 U [0.624]	0.983 U	0.197 U
1,2-Dibromoethane	µg/m ³	0.307 U [0.845 U]	1.54 U	0.307 U
1,2-Dichloroethane	µg/m ³	0.162 U [0.445 U]	0.809 U	0.162 U
1,2-Dichloropropane	µg/m ³	0.185 U [0.508 U]	0.924 U	0.185 U
1,3-Butadiene	µg/m ³	0.089 UJ [0.243 UJ]	0.442 UJ	0.089 UJ
1,3-Dichlorobenzene	µg/m ³	0.24 U [0.661 U]	1.2 U	0.24 U
1,4-Dichlorobenzene	µg/m ³	0.24 U [0.661 U]	1.2 U	0.24 U
Benzene	µg/m ³	0.447 U [1.23 U]	2.24 U	0.447 U
Bromodichloromethane	µg/m ³	2.57 [2.32]	1.34 U	0.482
Bromoform	µg/m ³	0.414 U [1.14 U]	2.07 U	0.414 U
Carbon Tetrachloride	µg/m ³	0.252 U [0.692 U]	1.26 U	0.302
Chlorobenzene	µg/m ³	0.184 U [0.506 U]	0.921 U	0.184 U
Chloroform	µg/m ³	58.6 [58.6]	28.9	32.7
cis-1,2-Dichloroethene	µg/m ³	0.285 [0.436 U]	0.793 U	0.158 U
Ethylbenzene	µg/m ³	0.174 UJ [0.478 UJ]	0.869 UJ	0.174 UJ
Isopropylbenzene	µg/m ³	4.92 U [13.6 U]	24.6 U	4.92 U
Methyl tert butyl ether	µg/m ³	0.144 UJ [0.815 J]	0.721 UJ	0.144 UJ
Methylene Chloride	µg/m ³	3.47 U [11.3]	17.4 U	3.47 U
Naphthalene	µg/m ³	0.524 UJ [1.45 UJ]	2.62 UJ	0.524 UJ
Tetrachloroethene	µg/m ³	1100 [1190]	5730	1120
Toluene	µg/m ³	0.377 UJ [1.22 J]	1.88 UJ	0.377 UJ
trans-1,2-Dichloroethene	µg/m ³	0.285 [0.436 U]	0.793 U	0.158 U
trans-1,3-Dichloropropene	µg/m ³	0.182 U [0.499 U]	0.908 U	0.182 U
Trichloroethene	µg/m ³	25.7 [23.8]	4.46	0.709
Vinyl Chloride	µg/m ³	0.102 U [0.281 U]	0.511 U	0.102 U
Xylenes	µg/m ³	0.521 U [1.44 U]	2.61 U	0.521 U

Notes:

U - Constituent not detected

J - Indicates an estimated value

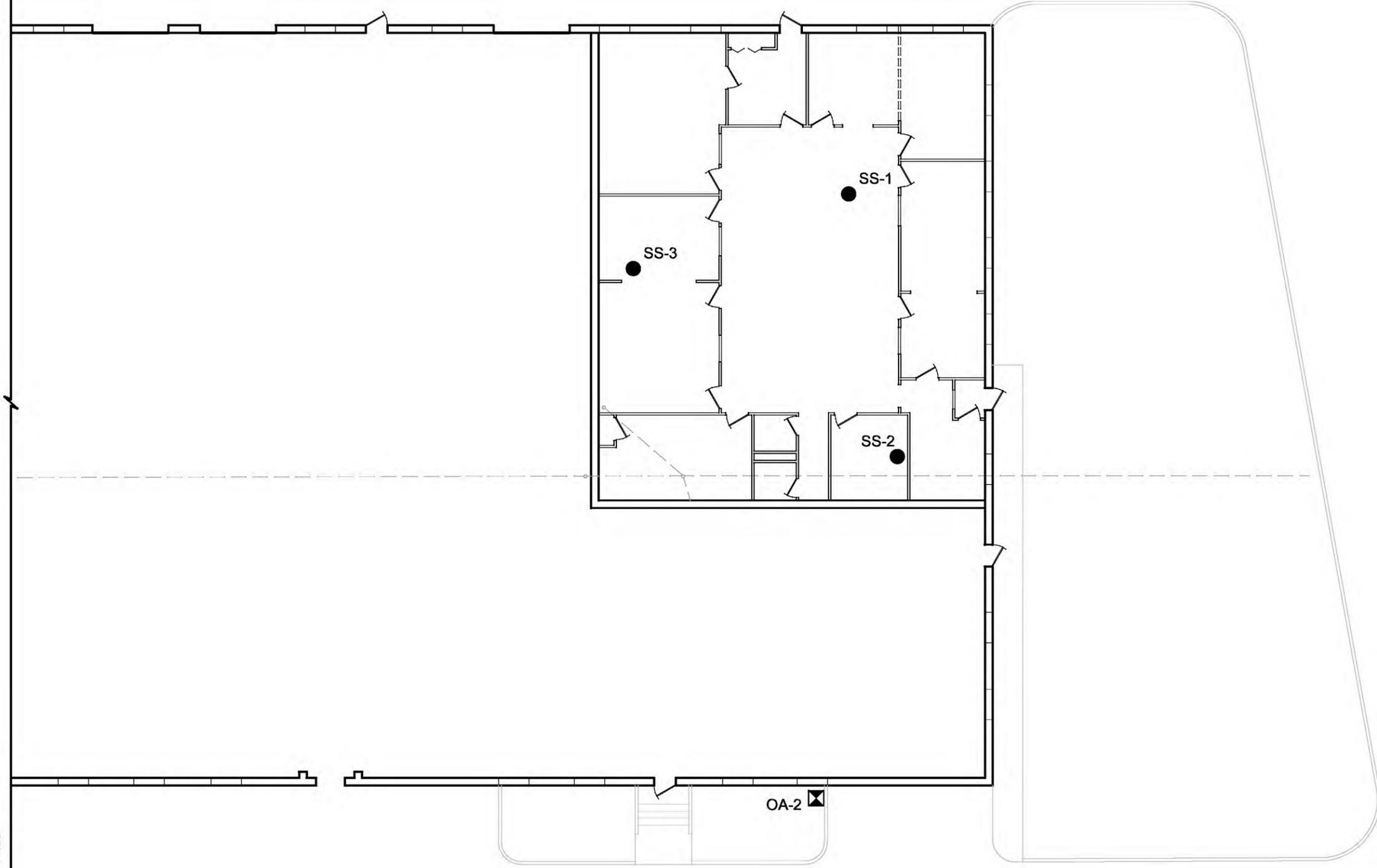
µg/m³ - micrograms per cubic meter

[0.6 U] - duplicate results presented in brackets

M OA-1



PROJECTNAME: Commercial Property.jpg
IMAGES: Commercial Property.jpg
4/28/2011 9:07 AM BY: SANCHEZ, ADRIAN



LEGEND:

- OA-1 IX OUTDOOR AMBIENT AIR SAMPLING LOCATION
- SS-1 • SUB-SLAB AND INDOOR AIR SAMPLING LOCATION



UNIFIRST PROPERTIES
WOBURN, MASSACHUSETTS
INDOOR AIR QUALITY AND VAPOR INTRUSION
ASSESSMENT: REPORT OF RESULTS

COMMERCIAL PROPERTY
SAMPLING LOCATIONS JUNE 2011



FIGURE
1



Appendix A

Sampling Logs



Indoor Air Sample Collection Log

		Sample ID:	AA-1-C AA-CP-1-0618204
Client:	Jai First	Outdoor/Indoor:	Outdoor
Project:	Wells G&H	Sample Intake Height:	3'
Location:	Woburn, MA	Tubing Information:	None
Project #:	MA 000909.0002.0003	Miscellaneous Equipment:	None
Samplers:	M. Wachsman	Time On/Off:	0305-1454
Sample Point Location:	New Park B/w CP & Jai First	Subcontractor:	None

Instrument Readings:

Date	Time	Canister Vacuum (a) (Inches of Hg)	Temperature (°F or °C)	Relative Humidity (%)	Air Speed (ft/min)	Barometric Pressure (Inches of Hg)	PID (ppb)
0/18/20	0305	-30"					
	0405	-17.7"	70°F	77%	0.5 mph	29.75	
	1454	-4.42"					

(a) Record canister information at a minimum at the beginning and end of sampling

SUMMA Canister Information:

Size (circle one):	1 L	(6 L)
Canister ID:	947	
Flow Controller ID:	071	
Notes:		

General Observations/Notes:

Documented of commercial Property at start and Finish of Sampling
--



Indoor Air Sample Collection Log

Client: <i>UniFirst</i>		Sample ID: <i>AA-CP-2-06182011</i>
Project: <i>Wells G & H</i>		Outdoor/Indoor: <i>Outdoor</i>
Location: <i>Woburn, MA</i>		Sample Intake Height: <i>4'</i>
Project #: <i>MA000989.0002.0003</i>		Tubing Information: <i>None</i>
Samplers: <i>M. Wadsworth</i>		Miscellaneous Equipment: <i>None</i>
Sample Point Location: <i>Near Fence B/w CP & UniFirst</i>		Time On/Off: <i>0305 - 1452</i>
		Subcontractor: <i>None</i>

Instrument Readings: *B/w CP & sandwich shop near dumpster*

Date	Time	Canister Vacuum (a) (inches of Hg)	Temperature (°F or °C)	Relative Humidity (%)	Air Speed (ft/min)	Barometric Pressure (Inches of Hg)	PID (ppb)
<i>6/18/2011</i>	<i>0305</i>	<i>-30"</i>					
	<i>0904</i>	<i>-17.5"</i>	<i>70°F</i>	<i>77%</i>	<i>0.5 mph</i>	<i>29.75</i>	
	<i>1452</i>	<i>-4.51"</i>					

(a) Record canister information at a minimum at the beginning and end of sampling

SUMMA Canister Information:

Size (circle one):	<i>1L</i>	<i>(6L)</i>
Canister ID:	<i>1688</i>	
Flow Controller ID:	<i>326</i>	
Notes:		

General Observations/Notes:

upwind of commercial property at start & finish



Indoor Air Sample Collection Log

Client: UniFirst		Sample ID: IA-CP-3-06182011
Project: Wells G&H		Outdoor/Indoor: indoor
Location: Woburn, MA		Sample Intake Height: 3'
Project #: MA000989.0002.00003		Tubing Information: None
Samplers: M. Walkman		Miscellaneous Equipment: None
Sample Point Location: Commercial property, back room		Time On/Off: 0300-1503
		Subcontractor: None

Instrument Readings:

Date	Time	Canister Vacuum (a) (Inches of Hg)	Temperature (°F or °C)	Relative Humidity (%)	Air Speed (ft/min)	Barometric Pressure (Inches of Hg)	PID (ppb)
6/18/2011	0300	-30.1					
	0910	-17.7"	71°F	72%	0	29.74	
	1503	-5.3"					

(a) Record canister information at a minimum at the beginning and end of sampling

SUMMA Canister Information:

Size (circle one):	1 L (6 L)
Canister ID:	589
Flow Controller ID:	367
Notes:	

General Observations/Notes:



Subslab Soil Vapor Sample Collection Log

DUP 550618 2011

Client: UniFirst		Sample ID: 55-CP-1-06182011
Project: Wells G & H		Boring Equipment: None
Location: Woburn, MA		Sealant: hydraulic cement
Project #: MA 000989-0002-00003		Tubing Information: PEX (low)
Samplers: M. Wadsworth		Miscellaneous Equipment: Purge pump
Sample Point Location: Commercial property Main Room		Subcontractor: None
Sampling Depth: 3 inches below slab		Equipment: —
Time and Date of Installation: 3/10/2011		Moisture Content of: Dry
		Approximate Purge Volume: 1 min @ 50 m ³ /min

Instrument Readings:

sample DUP

Date	Time	Canister Vacuum (a) (inches of Hg)	Temperature (°F or °C)	Relative Humidity (%)	Air Speed (ft/min)	Barometric Pressure (inches of Hg)	PID (ppb)
6/18/2011	1603	-20 ⁱⁿ / -20 ⁱⁿ	75°F	69%	0	29.65	
	1620	-20 ⁱⁿ / -28 ⁱⁿ					
	164-1638	-7.3 / -25.9					

(a) Record canister information at a minimum at the beginning and end of sampling

SUMMA Canister Information:

Tracer Test Information (if applicable):

Size (circle one):	1 L <input checked="" type="radio"/> 6 L
Canister ID:	1645
Flow Controller ID:	300
Notes:	

DUP
1587
357

Initial Helium Shroud:	51%
Final Helium Shroud:	52%
Tracer Test Passed:	<input checked="" type="radio"/> Yes <input type="radio"/> No
Notes:	0 ppm in purge

General Observations/Notes:

<p>Ⓢ Duplicate appears to not be working properly</p>

Approximating One-Well Volume (for purging):

When using 1/4-inch "Dummy Point" and a 6-inch sampling interval, the sampling space will have a volume of approximately 150 mL. Each foot of 1/4-inch tubing will have a volume of approximately 10 mL.



Subslab Soil Vapor Sample Collection Log

Client: <i>One First</i>		Sample ID: <i>SS-CP-2-06182011</i>
Project: <i>wells G & H</i>		Boring Equipment: <i>None</i>
Location: <i>Woburn, MA</i>		Sealant: <i>hydraulic cement</i>
Project #: <i>MAEXP989 0007-00003</i>		Tubing Information: <i>DePlo</i>
Samplers: <i>M. Jacksman</i>		Miscellaneous Equipment: <i>purge pump</i>
Sample Point Location: <i>Commercial Property, front office</i>		Subcontractor: <i>None</i>
Sampling Depth: <i>3 inches below slab</i>		Equipment: <i>—</i>
Time and Date of Installation: <i>3/10/2011</i>		Moisture Content of: <i>Dry</i>
		Approximate Purge Volume: <i>50ml (1min @ 50ml/min)</i>

Instrument Readings:

Date	Time	Canister Vacuum (a) (inches of Hg)	Temperature (°F or °C)	Relative Humidity (%)	Air Speed (ft/min)	Barometric Pressure (inches of Hg)	PID (ppb)
<i>6/18/2011</i>	<i>1515</i>	<i>-29.8"</i>	<i>75.3°F</i>	<i>73%</i>	<i>0</i>	<i>29.67</i>	
	<i>1530</i>	<i>-18.4"</i>					
	<i>1546</i>	<i>-6.8"</i>					

(a) Record canister information at a minimum at the beginning and end of sampling

SUMMA Canister Information:

Size (circle one):	<i>1 L</i> <input checked="" type="radio"/> <i>6 L</i>
Canister ID:	<i>742</i>
Flow Controller ID:	<i>223</i>
Notes:	

Tracer Test Information (if applicable):

Initial Helium Shroud:	<i>53%</i>
Final Helium Shroud:	<i>64%</i>
Tracer Test Passed:	<input checked="" type="radio"/> Yes <input type="radio"/> No
Notes:	<i>Opposed Purge</i>

General Observations/Notes:

Approximating One-Well Volume (for purging):

When using 1¼-inch "Dummy Point" and a 6-inch sampling interval, the sampling space will have a volume of approximately 150 mL. Each foot of ¼-inch tubing will have a volume of approximately 10 mL.



Subslab Soil Vapor Sample Collection Log

		Sample ID: <u>SS-CP-3-06182011</u>
Client: <u>OneFirst</u>		Boring Equipment: <u>None</u>
Project: <u>Wells G&H</u>		Sealant: <u>hydraulic cement</u>
Location: <u>Woburn, MA</u>		Tubing Information: <u>reflow</u>
Project #: <u>MA000989, 0002, 00003</u>		Miscellaneous Equipment: <u>Purge pump</u>
Samplers: <u>M. Jackman</u>		Subcontractor: <u>None</u>
Sample Point Location: <u>Commercial Property, Crib Room</u>		Equipment: <u>-</u>
Sampling Depth: <u>3 inches below slab</u>		Moisture Content of: <u>Dry</u>
Time and Date of Installation: <u>3/10/2011</u>		Approximate Purge Volume: <u>1 minute @ 50 ml/min</u>

Instrument Readings:

Date	Time	Canister Vacuum (a) (inches of Hg)	Temperature (°F or °C)	Relative Humidity (%)	Air Speed (ft/min)	Barometric Pressure (inches of Hg)	PID (ppb)
6/18/2011	1528	-29.6"	75°F	76%	0	24.68	-
	1542	-19.2"					
	1559	-5.5"					

(a) Record canister information at a minimum at the beginning and end of sampling

SUMMA Canister Information:

Size (circle one):	1 L	<input type="radio"/>	<input checked="" type="radio"/> 6 L
Canister ID:	<u>1666</u>		
Flow Controller ID:	<u>298</u>		
Notes:			

Tracer Test Information (if applicable):

Initial Helium Shroud:	<u>51% 52%</u>
Final Helium Shroud:	<u>62%</u>
Tracer Test Passed:	<input checked="" type="radio"/> Yes <input type="radio"/> No
Notes:	<u>Oppm in Purge Air</u>

General Observations/Notes:

Approximating One-Well Volume (for purging):

When using 1/4-inch "Dummy Point" and a 6-inch sampling interval, the sampling space will have a volume of approximately 150 mL. Each foot of 1/4-inch tubing will have a volume of approximately 10 mL.



Appendix B

Building Survey and Product
Inventory Field Form

Indoor Air Quality Building Survey

Sampler: Match background Date: 6/16/2011 JCO #: _____

Address: 21 X Olympia Avenue
Woburn, MA

Contact Name: Colleen Muloney - Benedix

List of Current Occupants/Occupation:

Age (if under 18)	Sex (m/f)	Occupation
7-40 yrs	F	Director
18-60 yrs	13 Females	staff
3 mo - 6 yrs	39 children	

Building Construction Characteristics:

What type of building is it? (Circle appropriate responses)

- Single Family Multi-Family School Commercial Industrial
- Ranch 2-Family
 Raised Ranch Duplex
 Cape Apartment House (# of units ____)
 Colonial Condominium (# of units ____)
 Split Level Other (specify) Commercial, slab-on-grade
 Mobile Home

General description of building construction materials: Brick, slab steel

Number of occupied stories: 1 Year built? 1970's/1980's

Has the building been weatherized with any of the following? (Circle all that apply)

- Insulation Storm windows Energy-efficient windows Other (specify)

Attached garage? (Y/N) N Vehicle(s) present? (Y/N) —

What type of basement does the building have? (Circle all that apply)

Full basement Crawlspace Slab-on-grade Other (specify)

What are the characteristics of the basement? (Circle all that apply)

Finished	<u>Basement Floor:</u>	<u>Foundation Walls:</u>	<u>Moisture:</u>
Unfinished	Concrete	Poured concrete	Wet
Partially finished (%)	Dirt	Block	Damp
	Other (specify)	Field stone	Dry

Is a basement sump present? (Y/N) _____ Is sump sealed to indoor air? (Y/N) _____

Does the basement have any of the following characteristics (e.g., preferential vapor pathways) that might permit soil vapor entry? (Circle all that apply)

Cracks Pipe/utility conduits Other (specify)
Foundation/slab drainage Sump pumps

Heating and Ventilation System(s) Present:

What types of heating system(s) are used in this building? (Circle all that apply)

Hot air circulation Heat pump Steam Radiation Wood stove
Other (specify) Air conditioner (central)/window Fireplace (wood/gas)

What types of fuels are used in this building? (Circle all that apply)

Natural gas Electric Coal Other (specify)
Fuel oil Wood Solar

What type of mechanical ventilation systems are present and/or currently operating in this building?

(Circle all that apply)

Central air conditioning Mechanical fans Bathroom vent fan
Individual air conditioning Kitchen range hood Air-to-air heat exchanger
Open windows Other (specify)

Sources of Chemical Contaminants:

Source: MaDEP, 2002, "Indoor Air Sampling and Evaluation Guide, WSC Policy #02-430", Office of Research and Standards, Massachusetts Department of Environmental Protection, April, 2002.

THE JOHNSON COMPANY, INC.

100 State Street, Suite 600
 Montpelier, Vermont 05602
 (802) 229-4600

SOP-JCO-063-002

DRAFT

Page 3 of 4

Which of these are present in the building?

Potential VOC Source	Location of Source	Major Ingredients	Removed Prior to Air Sampling (Y/N/NA)
Paint or paint thinners	Kitchen	See product inventory	Yes
Gas-powered equipment			
Gasoline storage cans			
Cleaning solvents	Kitchen	See product inventory	Yes
Air fresheners			
Oven cleaners			
Carpet/ upholstery cleaners	Kitchen	See product inventory	Yes
Hairspray			
Nail polish/ remover			
Bathroom cleaner	Kitchen	See product inventory	Yes
Appliance cleaner			
Furniture/ floor polish			
Moth balls			
Fuel oil tank			
Wood stove			
Fireplace			
Perfume/ colognes			
Hobby supplies			
Scented potpourri, etc			
Brake cleaner			
Liquid Wrench			
Other			
Other			
Other			

Do one or more smokers occupy this building on a regular basis? 1 smoker

Has anyone smoked in the building in the last 48 hours? (Y/N) NO

Do the occupants frequently have clothes dry-cleaned? (Y/N) NO

Any recent remodeling or repainting (Y/N, describe) New Paint last spring

Any obvious pressed wood products (e.g. hardwood plywood paneling, particleboard, fiberboard)? (Y/N) _____

Are there any new upholstery, drapes, carpets, or other textiles? (Y/N) _____

Source: MaDEP, 2002, "Indoor Air Sampling and Evaluation Guide, WSC Policy #02-430", Office of Research and Standards, Massachusetts Department of Environmental Protection, April, 2002.

Has the building been treated with any insecticides/pesticides? If so, how often and what chemicals were used? Raid last summer

Do any of the occupants apply pesticides/herbicides in the yard or garden? If so, how often and what chemicals are used? NO

Outdoor Sources of Contamination:

Is there any stationary emission source in the vicinity of the building? NO

Are there any mobile emission sources (e.g., highway; bus stop; high-traffic area) in the vicinity of the building?

highway & busy roads

Weather Conditions During Sampling:

Outside Temperature (°F): 70-75°F

Prevailing wind direction: West to East

Describe the general weather conditions (e.g., sunny, cloudy, rain):

Warm and sunny

Was there any significant precipitation (0.1 inches) within 12 hours preceding the sampling event? NO

Type of ground cover (e.g., grass, pavement, etc.) outside the building: pavement

General Comments

Is there any other information about the structural features of this building, the habits of its occupants or potential sources of chemical contaminants to the indoor air that may be of importance in facilitating the evaluation of the indoor air quality of the building?



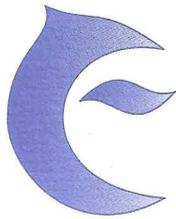
Chemical Inventory - Commercial Property

Name	VOC Ingredient(s)	Removed?
Shout Laundry Stain Remover		Yes
Rustoleum Specialty Appliance Epoxy	Toluene	Yes
Rustoleum Rust Reformer	Toluene, Acetone, Xylene	Yes
Raid Ant Spray	Petroleum Distillates	Yes
Fabro-tac Permanenet Adhesive		Yes
Goo-Gone Spray Gel	Petroleum Distillates	Yes
409 All Purpose Cleaner		Yes
Clorox Bleach		Yes
Lysol	Ethanol	Yes
Purell Hand Sanitizer	Ethanol	Yes
Perfect Glass Wipes		Yes
Clorox Clean-Up With Bleach		Yes
Clorox Wipes		Yes
Windex		Yes
Berkley Jensen Instant Hand Sanitizer	Isopropyl Alcohol	Yes
Comet Powder		Yes
Joy Dish Soap		Yes
Febreeze		Yes
Swiffer Pads		Yes
Aerosal Sunscreen	Isobutane, Denatured Alcohol	No



Appendix C

Data Validation Report



Phoenix Chemistry Services

Aug. 8, 2011

Nadine Weinberg
ARCADIS, U.S., Inc.
482 Congress Street, Suite 501
Portland, ME 04101

Reference #: 2011-0705-001 & -002, and 2011-0715-001 & -002

Dear Nadine,

Phoenix Chemistry Services has submitted four reports on August 4 - 5, 2011 presenting the results of the data validation of Sample Delivery Group (SD) Nos. L1108879, L1108880, L1108884, and L1108885 from the Indoor Air Quality/Vapor Intrusion (IAQ/VI) assessment work at several residential and/or commercial properties in Woburn, MA. The indoor and outdoor air and sub-slab vapor samples in these SDGs were collected June 16 - 18, 2011. The laboratory analyses were performed by Alpha Analytical Laboratories, Inc. of Mansfield, MA.

The data packages and electronic deliverables were received on July 5 and 15, 2011. Two separate data packages for the canister certifications (SDG Nos. L1108049 and L1108435), and associated files L1108879.pdf, L1108880.pdf, L1108884.pdf, L1108885A.pdf, and L1108885B.pdf were received on June 16, 2011. The validation has been performed by Phoenix Chemistry Services according to the Tier III guidelines as defined by USEPA Region I, as presented in "Region I EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses", December, 1996. The EPA's National Functional Guidelines for Organic Data Review (EPA 540/R-99/008, October, 1999), the IAQ/VI Quality Assurance Project Plan (QAPP), and the Field-Laboratory Coordination Memorandum (Phoenix Chemistry Services, March 25, 2010) were also considered during the evaluation, and professional judgment was applied as necessary and appropriate. Data qualifiers have been applied in the final validation report as necessary and appropriate, in accordance with these guidelines.

The samples in these four data packages were collected as a single sampling round, and utilized shared quality control (QC) samples, including two trip blanks, four outdoor air samples, four field duplicate pairs, and two laboratory replicates. The trip blanks and laboratory replicates were each logged in and reported in at least two data packages to avoid collecting redundant QC samples, as requested by the field engineer. Only one set of results for these QC samples was retained in the project database to avoid duplications; the earliest laboratory identifier was selected to be validated and reported. The laboratory is maintaining the original reporting packages.

A reporting error was noted in the clean canister certification package SDG No. L1108435; an incorrect copy of the initial calibration was included in the raw data section, and the continuing calibration presented incorrect percent difference values, as the compounds were evaluated against the incorrect initial calibration. The laboratory quickly responded to the validator's request for a copy of the missing initial calibration, however, a revision of the data package with the corrected continuing calibration has not yet been received (the validator performed the checks manually after receiving the correct initial calibration). The laboratory should be reminded that this is still outstanding.

Thank you for this opportunity to provide data validation services to ARCADIS. If there are any questions or concerns about the material in this report, please do not hesitate to contact me for help and clarification.

Sincerely,

Deborah H. Gaynor, Ph.D.
Principal, Phoenix Chemistry Services

Phoenix Chemistry Services | 126 Covered Bridge Road | North Ferrisburg | Vermont | 05473

Telephone: (802) 233-2473 | Website: www.phoenixchemistryservices.com | Email: dgaynor@phoenixchemistryservices.com

DATA VALIDATION

FOR

**UniFirst-Woburn Vapor Intrusion Assessment
Woburn, MA**

**ORGANIC ANALYSIS DATA
Selected Volatiles in Air Samples**

**Sample Delivery Group (SDG) No.
L1108885**

Chemical Analyses Performed by:

**Alpha Analytical Laboratories, Inc.
320 Forbes Blvd.
Mansfield, MA 02048**

FOR

**ARCADIS U.S., Inc.
482 Congress Street, Suite 501
Portland, ME 04101**

Data Validation Report by:

**Phoenix Chemistry Services
126 Covered Bridge Rd.
N. Ferrisburg, VT 05473
(802) 233-2473
Aug. 5, 2011**

**Reference #2011-0715-002
VOA Air Validation Report/L1108885/dhg**

EXECUTIVE SUMMARY

Phoenix Chemistry Services (Phoenix) has completed the validation of the Method TO-15 Selected Ion Monitoring (SIM) volatiles in air analysis data prepared by Alpha Analytical Laboratories of Mansfield, MA, for 10 air samples from a residential property in Woburn, MA. The laboratory reported the data under Sample Delivery Group (SDG) No. L1108885, which was submitted as a single data package received by Phoenix on July 15, 2011, and includes the following samples:

Sample ID	Laboratory ID
AA-CP-1-06182011	L1108885-02
AA-CP-2-06182011	L1108885-03
IA-CP-1-06182011	L1108885-04
IA-CP-2-06182011	L1108885-05
DUPIA-06182011	L1108885-06
IA-CP-3-06182011	L1108885-07
SS-CP-1-06182011	L1108885-08
SS-CP-2-06182011	L1108885-09
SS-CP-3-06182011	L1108885-10
DUPSS-06182011	L1108885-11

A cross-reference table of sample IDs was provided in the data package. Two separate data packages, SDG Nos. L1108049 and L1108435, containing the supporting documentation (clean can certifications) for the preparation and analysis of the sampling canisters, and two files (L1108885A.pdf and L1108885B.pdf) containing the raw data for the vacuum check upon receipt and the flow controller rate checks, were also submitted on June 16 and July 15, 2011, respectively.

The samples in this data set represent the indoor air and the sub-slab soil vapor samples (matched to the indoor sampling locations) collected on June 18, 2011 in Woburn, MA inside a residential building, and two ambient air samples collected outdoors at the sample location on June 18, 2011. All samples were kept in the engineer's custody after sampling until hand-delivered by laboratory courier to the laboratory on June 21, 2011.

Findings of the validation effort resulted in the following qualifications of sample results:

- Results for naphthalene and 1,3-butadiene in all samples were qualified as estimated (J, UJ).
- Results for methyl tert-butyl ether (MTBE), toluene, ethylbenzene, and naphthalene in all samples were qualified as estimated (J, UJ).
- Results for tetrachloroethene initially outside the calibration range in the original analyses of samples SS-CP-1-6182011, SS-CP-3-06182011, and SS-CP-2-06182011 were rejected (R), and replaced with the acceptable concentrations from the corresponding diluted samples (SS-CP-1-6182011DL, SS-CP-3-06182011DL, and SS-CP-2-06182011DL).
- The laboratory appropriately applied "J" qualifiers to the CLP-like sample Form 1s when the

concentration of an analyte was less than the sample-specific QL for the analytes naphthalene, 1,2-dibromoethane, and bromodichloromethane in the TO-15 SIM analysis. The validator did not remove these qualifiers.

The Overall Evaluation of Data (Section XVI) summarizes the validation results. The validation findings and conclusions for each analytical parameter are detailed in the remaining sections of this report.

Documentation problems observed in the data package are described in Section XVII.

This validation report shall be considered part of the data package for all future distributions of TO - 15 SIM (volatiles in air) analysis data for SDG No. L1108885.

INTRODUCTION

Analyses of selected volatiles in air samples were performed according to Method TO-15, as modified for Selected Ion Monitoring (SIM) in the laboratory standard operating procedure (SOP) No. A-001, and in accordance with requirements in the Quality Assurance Project Plan (QAPP) for Indoor Air Quality and Vapor Intrusion Assessment, Rev. 2, March, 2010. The target compound list was limited to the compounds listed in Form K of the QAPP, and reporting limits are as specified there.

Tentative identification of non-target analyte peaks (i.e., tentatively identified compounds, or TICs) was not requested for these analyses.

Phoenix's validation was performed in conformance with Tier III guidelines as defined by USEPA Region I. Data qualifiers are applied as necessary and appropriate. To the extent possible, the data were evaluated in accordance with the "Region I EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses", December, 1996. EPA's National Functional Guidelines for Organic Data Review (EPA 540/R-94/012, 2/94) and the QAPP were also considered during the evaluation, and professional judgment was applied as necessary and appropriate.

The data validation process evaluates data on a technical basis for chemical analyses conducted under the USEPA Contract Laboratory Program (CLP) or other well-defined methods. Contract compliance is evaluated only in specific situations. Issues pertaining to contractual compliance are noted where applicable. It is assumed that the data package is presented in accordance with the CLP requirements. It is also assumed that the data package represents the best efforts of the laboratory and has already been subjected to adequate and sufficient quality review prior to submission for validation.

Results of sample analyses are reported by the laboratory as either qualified or unqualified; various qualifier codes are used by the laboratory to denote specific information regarding the analytical results. During the validation process, laboratory data are verified against all available supporting documentation. Based on this evaluation, qualifier codes may be added, deleted or modified by the data validator. Raw data is examined in detail to check calculations, compound identification, and/or transcription errors. Validated results are either qualified or unqualified; if results are unqualified, this means that the reported values may be used without reservation. Final validated results are annotated with the following codes, as defined in the EPA Region I Functional Guidelines:

- U - The analyte was analyzed for, but was not detected. The associated numerical value is the sample quantitation limit. The sample quantitation limit accounts for sample specific dilution factors and percent solids corrections or sample sizes that deviate from those required by the method.
- J - The associated numerical value is an estimated quantity.
- UJ - The analyte was analyzed for, but was not detected. The sample quantitation limit is an estimated quantity.
- R - The data are unusable (analyte may or may not be present). Resampling and reanalysis is necessary for verification. The R replaces the numerical value or sample quantitation limit.

In some instances (e.g., a dilution) a result may be indicated as “rejected” to avoid confusion when a more quantitatively accurate result is available.

EB, TB, BB - An analyte that was identified in an aqueous equipment (field) blank, trip blank, or bottle blank that was used to assess field contamination associated with soil/sediment samples. These qualifiers are to be applied to soil/sediment sample results only.

These codes are assigned during the validation process and are based on the data review of the results. They are recorded in the “Validator_Qualifier” column, and are also found with the validated laboratory-applied qualifiers in the “Qualifier” column in the electronic spreadsheet contained in Attachment A.

All data users should note two facts. First, **the "R" qualifier means that the laboratory-reported value is completely unusable.** The analysis is invalid due to significant quality control problems, and provides no information as to whether the compound is present or not. Rejected values should not appear on data tables because they have no useful purpose under any circumstances. Second, **no analyte concentration is guaranteed to be accurate even if all associated quality control is acceptable.** While strict quality control conformance provides well-defined confidence in the reported results, any analytical result will always contain some error.

The user is also cautioned that the validation effort is based on the materials provided by the laboratory. Software manipulation, resulting in misleading raw data printouts, cannot be routinely detected during validation; unless otherwise stated in the report, these kinds of issues are outside the scope of this review.

Detailed Findings of Measurement Error Associated with the Analytical Analysis

I. Sample Integrity

The outdoor and indoor air samples for volatiles analysis were collected over an 8 to 12 hour period on June 18, 2011, and the matching sub-slab (soil vapor) samples were collected in the early afternoon of June 18, 2011 for an approximately 30-minute period. The property is located in Woburn, MA. All analyses were performed within eleven (11) days after sample collection, which is within the 30 day holding time defined in Method TO-15.

The canisters were delivered by laboratory courier to the field sampler's possession and after sampling the canisters were hand-delivered by laboratory courier to the laboratory three days after collection ended; the canisters were kept in the field engineer's office during the intervening days. Two separate data packages, SDG Nos. L1108049 and L1108435, were also submitted (on June 16, 2011), containing the supporting documentation (clean can certification) for the preparation and pre-sampling cleanliness check analysis of the canisters; the raw data for the vacuum and flow controller checks, as documented in the files L1108885A.pdf and L1108885B.pdf were submitted on June 16, 2011.

The Chain of Custody (COC) and the Canister and Flow Controller Information records show that the sample canisters were collected and transported according to method specifications.

All canisters submitted to the field for use met all applicable method requirements. Raw data for the initial calibration used for the analysis of one of the canisters used in this sampling round was not submitted in the data package L11088435; the laboratory supplied the missing documentation at the validator's request. An incorrect version of the continuing calibration for this canister certification analysis was not supplied as requested, so the validator calculated the percent difference values for this analysis from the raw data. The laboratory has been informed that this data is still missing and should be submitted.

The canister used for collection of the field duplicate sample DUPSS-06182011 failed to collect a full sample volume; consultation between the field sampler and the data validator determined that the expected analyte concentrations in this sample were sufficiently high that the dilution necessitated by the limited sample volume would not prevent an acceptable analysis, and the laboratory was instructed to proceed with a dilution analysis for this canister. Based on otherwise acceptable sampling equipment conditions at receipt, and the expected high concentrations for the limited volume sample DUPSS-06182011, sample integrity was deemed acceptable for all samples.

Field log books containing records of height of canister intake, barometric pressure, and ambient temperature at sampling locations were not submitted for review as part of this validation effort.

II. GC/MS Instrument Performance Check (Tuning)

The samples for volatiles in air analyses from SDG No. L1108885 were analyzed on a single GC/MS system identified as instrument Airlab7. The tuning of this instrument was demonstrated with analysis of 4-bromofluorobenzene (BFB); tunes were analyzed for each 24-hour period during which the samples or

associated standards were analyzed. All three BFB tunes were correctly calculated, within acceptance limits, and are reported accurately on the Form 5 summaries in the data package.

III. Initial Calibration (IC)

One IC (6/25/11) was performed on instrument Airlab7 in support of the TO-15 SIM sample analyses. The IC was performed at ten concentration levels (0.02, 0.04, 0.1, 0.2, 0.5, 1.0, 2.5, 5.0, 10, and 50 part per billion by volume [ppbv]), except that the 0.02 ppbv standard was not used for calibration of naphthalene. It was noted that a standard at 20 ppbv was also analyzed and included in the data package, but was not used in the instrument calibration. Documentation of all individual IC standards was present in the data package and relative response factor (RRF) as well as percent relative standard deviation (%RSD) values were correctly calculated and accurately reported on the Form 6 summary.

Manual integrations for some target analytes, internal standards, or surrogate standards were performed in some standards and samples in this data set. The before and after ion chromatograms, the reason for the manual integration, and the analyst's initials and date were printed for each manual integration.

All average RRF values were above the 0.05 minimum criterion, and all %RSDs were below the maximum limit (30%) specified by Region I, with the exception that naphthalene exhibited a 37.3 %RSD.

An Independent Calibration Verification (ICV) sample analysis at 20 ppbv was analyzed on 6/27/11. All spiked analytes were recovered within 70 – 130 % recovery of expected values in the ICV analysis, with the exception of 1,3-butadiene, which was recovered at -41.7 % recovery.

Since the reporting limit for naphthalene is set above the lowest standard used in the calibration, no actions are necessary on the basis of the modification of the initial calibration range for this compound. On the basis of the unacceptably high %RSD value in the associated IC, results for naphthalene in all samples were qualified as estimated (J, UJ). On the basis of the unacceptably low recovery in the associated ICV analysis, results for 1,3-butadiene in all samples were qualified as estimated (J, UJ).

IV. Continuing Calibration (CC)

One continuing calibration (CC) standard performed on 6/29/11 was reported in support of the TO-15 SIM sample analyses reported in this data package; this analysis is also reported as the laboratory control sample analysis for this analytical window. Since this is an independent standard, this is acceptable, although redundant. Sample results were properly reported using the average RRF of the calibration curve for quantitation. Documentation of the standard analysis was present, and RRF as well as percent difference (%D) values were reported on the Form 7 summary within the data package.

All RRF values were above the 0.05 minimum criterion, and all %D values were below the maximum limit (25%) specified by Region 1, with the following exceptions:

Table 1. Continuing Calibration (CC) Standard Exceedances

CC Date & Time	Analyte	%D	Associated Samples
6/29/11 14:07	methyl tert-butyl ether (MTBE)	+26.9	all samples
	toluene	+27.1	
	ethylbenzene	+25.8	
	naphthalene	-27.2	

It should be noted that a positive % D value (the CC response factor is less than the IC response factor) will result in a low bias for positive detects, and a negative % D will result in a high bias for positive detects.

On the basis of the unacceptably high %D values in the associated CC standard, results for methyl tert-butyl ether (MTBE), toluene, ethylbenzene, and naphthalene in all samples were qualified as estimated (J, UJ).

V. Blanks

Results for one air-matrix laboratory method blank (MB) were reported in association with the TO-15 SIM sample analyses. No target compounds were found in the MB.

One trip blank (TB), which was used as a field blank, was reported in this data package. The date of collection for the TB was set as 6/18/11, since it was used for sample canisters collected between 6/16/11 and 6/18/11 at two locations submitted to the lab at the same time. No target compounds were found in the TB.

Neither a trip blank nor a field blank is required for Method TO-15.

VI. Surrogate Compounds

No surrogate compounds are used in these methods.

VII. Internal Standards (IS)

All IS areas and retention times (RT) were within the established QC limits for all reported sample analyses in this data package.

VIII. Laboratory Duplicates

A matrix spike/matrix spike duplicate (MS/MSD) analysis is not used in this method. A laboratory duplicate analysis of a field sample (matrix duplicate) analysis is also not required but was performed per laboratory protocols. A laboratory duplicate was selected from the samples collected during the same

sampling set on June 18, 2011, and reported in SDG No. L1108884. Relative percent difference (RPD) values were reported on a Form 3 summary within that data package.

Precision in the laboratory duplicate analyses (5.5 %RPD) was acceptable (less than 30 % RPD, for the single analyte greater than five times the reporting limit, on the basis of professional judgment).

IX. Field Duplicates

Two field duplicate pairs were collected in this sample set. Sample IA-CP-2-06182011 was identified as the field duplicate of DUPIA-06182011, and sample SS-CP-1-06182011 was identified as the field duplicate of DUPSS-06182011.

Relative percent difference (RPD) values for compounds detected at greater than five times the quantitation limit in at least one member of a field duplicate pair must be less than 25 %RPD as per the QAPP. Precision (range, 1.8 – 14.8 %RPD) in the indoor air field duplicate pair was acceptable (less than 30 %RPD for all analytes detected at values greater than five times the reporting limit, on the basis of professional judgment), and precision in the sub-slab field duplicate pair (samples SS-CP-1-06182011 and DUPSS-06182011; range 0.0 to 8.8 %RPD) was acceptable for all analytes greater than five times the sample-specific reporting limit (adjusted for sample volume and dilution).

X. Sensitivity Check

An MDL study for the TO-15 SIM method was analyzed by the laboratory on May 7, 2009, and the most recent verification study was performed between February 3 and 4, 2010. All target analytes in the statistical study had calculated MDLs below the method quantitation limits (QLs), and demonstrated acceptable ratios (at least 3:1) of the QL to the MDL. The QLs are also supported by the low concentration standard (at 0.020 ppbv) in the initial calibration.

Project objectives required a low reporting limit (RL) for naphthalene, and in order to achieve project objectives for detection limits, the analytes 1,2-dibromoethane (EDB), bromodichloromethane, and naphthalene were evaluated by the laboratory down to one-half the RL; concentrations between one-half the RL and the RL were reported with a “J” qualifier to indicate that this was an estimated concentration on the Form 1 summaries; results below the QL were only detected for naphthalene in this sample set.

On the basis of acceptable sensitivity and accuracy, as demonstrated by the MDL study and supported by the initial calibration, all results for the TO-15 SIM method (detects and non-detects) not qualified for other reasons are deemed acceptable as reported.

XI. Performance Evaluation Samples (PES)/Accuracy Check

One zero blind PE samples (commonly known as a laboratory control sample, LCS) was prepared and analyzed by the laboratory in support of the TO-15 SIM sample analyses; this analysis was also reported as the CC standard analysis for this data set. All target analytes were spiked into the QC sample at 20 ppbv. Percent recoveries (%R) were correctly calculated for the spiked compounds, accurately reported on the Form 3 summary in the data package, and were within the laboratory established QC limits (70 - 130 %R) for all target analytes. No spiked duplicate analyses were performed for either method, so laboratory precision was not evaluated using spiked analyses.

No external single-blind PES sample for either method was required or submitted with the samples in this data set.

XII. Target Compound Identification

Reported target compounds were correctly identified for all samples in this data set.

XIII. Compound Quantitation and Reported Quantitation Limits

Target compound quantitation and practical quantitation limits (PQLs) were accurately reported on the Form 1 summaries. Results below the RL are not reported by the laboratory for this method. However, at the client's request, positive results for naphthalene, bromodichloromethane, and 1,2-dibromoethane (EDB) were evaluated down to one-half the RL, and reported with a "J" qualifier by the laboratory on the Form 1s.

One compound was reported with reporting limits slightly higher than specified in the QAPP. Total xylenes were reported with a quantitation limit of 0.261 ug/m^3 . No qualifications were deemed necessary on the basis of the RL slightly above that specified in the QAPP for total xylenes, since this concentration is still well below the risk screening level.

Samples SS-CP-1-06182011 and SS-CP-3-06182011 were analyzed at an initial two-fold dilution, sample SS-CP-2-06182011 was analyzed at an initial 10-fold dilution, and sample DUPSS-06182011 was analyzed at an initial dilution factor of 5.5 on the basis of laboratory judgment. Tetrachloroethene was detected above the linear range of the instrument in samples SS-CP-1-6182011, SS-CP-3-06182011, and SS-CP-2-06182011; these samples were reanalyzed at an appropriate further dilution to bring tetrachloroethene within the upper half of the calibration range, and both sets of analyses were reported in the data package.

Results for tetrachloroethene initially outside the calibration range in the original analyses of samples SS-CP-1-6182011, SS-CP-3-06182011, and SS-CP-2-06182011 were rejected (R), and replaced with the acceptable concentrations from the corresponding diluted samples (SS-CP-1-6182011DL, SS-CP-3-06182011DL, and SS-CP-2-06182011DL).

The laboratory appropriately applied "J" qualifiers to the CLP-like sample Form 1s when the concentration of an analyte was less than the sample-specific QL for the analytes naphthalene, 1,2-dibromoethane, and bromodichloromethane in the TO-15 SIM analysis. The validator did not remove these qualifiers (results below the QL were only detected for naphthalene in this sample set).

The values that the validator has judged to be acceptable are presented on the electronic deliverable generated from the project database (Attachment A). Qualifiers applied by the validator during the validation effort have been listed on the electronic spreadsheet in an additional column labeled "Validator_Qualifier". The column labeled "Qualifier" contains both qualifiers applied by the laboratory and those applied by the validator; all qualifiers in this column have been accepted or changed during the validation effort. The column labeled "PreValidationFlag", which is generated by the database utility, also indicates which qualifiers were changed by the validator. Sample-specific quantitation limits may be found on the Form 1 for each sample or in the electronic deliverable (Attachment A, column "ReportingLimit").

The Form 1s submitted in the data package present results in units of $\mu\text{g}/\text{m}^3$ as well as in ppbv. Results are also presented almost entirely in units of $\mu\text{g}/\text{m}^3$ in the electronic data deliverable (EDD). Both the forms and the EDD were examined during the data validation process.

All positive results are listed on the electronic data deliverable, whether or not the value or qualifier was changed as a result of the validation. All non-detected results are listed on the electronic data deliverable with a Qualifier of "U" or "UJ"; these are also found as less-than (<) values in the "TextResult" column. If the reported result value was changed during the validation effort from a positive result to a value representing a concentration not detected at or below, the value representing the new reporting limit is reported as the Result with a Validator Qualifier of "U" or "UJ" and a "<" sign in the "TextResult" column.

XIV. Tentatively Identified Compounds (TICs)

Evaluation of unidentified, non-target analyte peaks was not requested or performed for these samples.

XV. System Performance

The analytical system appears to have been working acceptably, based on instrument printouts and spectral quality.

XVI. Overall Evaluation of Data

Findings of the validation effort resulted in the following qualifications:

- On the basis of the unacceptably high %RSD value in the associated IC, results for naphthalene in all samples were qualified as estimated (J, UJ).
- On the basis of the unacceptably low recovery in the associated ICV analysis, results for 1,3-butadiene in all samples were qualified as estimated (UJ).
- On the basis of the unacceptably high %D values in the associated CC standard, results for methyl tert-butyl ether (MTBE), toluene, ethylbenzene, and naphthalene in all samples were qualified as estimated (J, UJ).

- Results for tetrachloroethene initially outside the calibration range in the original analyses of samples SS-CP-1-6182011, SS-CP-3-06182011, and SS-CP-2-06182011 were rejected (R), and replaced with the acceptable concentrations from the corresponding diluted samples (SS-CP-1-6182011DL, SS-CP-3-06182011DL, and SS-CP-2-06182011DL).
- The laboratory appropriately applied “J” qualifiers to the CLP-like sample Form 1s when the concentration of an analyte was less than the sample-specific QL for the analytes naphthalene, 1,2-dibromoethane, and bromodichloromethane in the TO-15 SIM analysis. The validator did not remove these qualifiers.

XVII. Documentation

The required records for canister cleanliness were submitted as a separate data package, SDG No. L1108049, and all required records were properly included with this data package. Canister cleanliness and auxiliary equipment status was acceptable upon release from the laboratory, and appropriate checks and actions were performed as required upon sample and equipment receipt.

The chain of custody (COC) records were present and accurately completed for all reported samples.

Data presentation was acceptable, with the following observation:

- Raw data for the initial calibration used for the analysis of one of the canisters used in this sampling round was not submitted in the data package L11088435; the laboratory supplied the missing documentation at the validator’s request. An incorrect version of the continuing calibration for this canister certification analysis was not supplied as requested, so the validator calculated the percent difference values for this analysis from the raw data. The laboratory has been informed that this data is still missing and should be submitted.
- One compound was reported with reporting limits slightly higher than specified in the QAPP. Total xylenes were reported with a quantitation limit of 0.261 ug/m³.

This validation report should be considered part of the data package for all future distributions of the TO-15 SIM (volatiles in air) analysis data for SDG No. L1108885.

ATTACHMENT A

ELECTRONIC DELIVERABLE (EDD)

SDG No. L1108885

**Selected Volatiles in Air Samples
(submitted electronically)**



Appendix D

Laboratory Analytical Data Package



ANALYTICAL REPORT

Lab Number:	L1108885
Client:	Arcadis 482 Congress Street Suite 501 Portland, ME 04101
ATTN:	Nadine Weinberg
Phone:	(207) 828-0046
Project Name:	UNIFIRST WELLS G&H
Project Number:	MA000989.0002.00003
Report Date:	07/05/11

The original project report/data package is held by Alpha Analytical. This report/data package is paginated and should be reproduced only in its entirety. Alpha Analytical holds no responsibility for results and/or data that are not consistent with the original.

Certifications & Approvals: MA (M-MA030), NY (11627), CT (PH-0141), NH (2206), NJ (MA015), RI (LAO00299), ME (MA0030), PA (Registration #68-02089), LA NELAC (03090), FL NELAC (E87814), US Army Corps of Engineers.

320 Forbes Boulevard, Mansfield, MA 02048-1806
508-822-9300 (Fax) 508-822-3288 800-624-9220 - www.alphalab.com



Project Name: UNIFIRST WELLS G&H
Project Number: MA000989.0002.00003

Lab Number: L1108885
Report Date: 07/05/11

Alpha Sample ID	Client ID	Sample Location	Collection Date/Time
L1108885-01	TB06182011	WOBURN, MA	06/18/11 00:00
L1108885-02	AA-CP-1-06182011	WOBURN, MA	06/18/11 14:54
L1108885-03	AA-CP-2-06182011	WOBURN, MA	06/18/11 14:52
L1108885-04	IA-CP-1-06182011	WOBURN, MA	06/18/11 15:03
L1108885-05	IA-CP-2-06182011	WOBURN, MA	06/18/11 14:56
L1108885-06	DUPIA06182011	WOBURN, MA	06/18/11 00:00
L1108885-07	IA-CP-3-06182011	WOBURN, MA	06/18/11 15:03
L1108885-08	SS-CP-1-06182011	WOBURN, MA	06/18/11 16:38
L1108885-09	SS-CP-2-06182011	WOBURN, MA	06/18/11 15:46
L1108885-10	SS-CP-3-06182011	WOBURN, MA	06/18/11 15:59
L1108885-11	DUPSS06182011	WOBURN, MA	06/18/11 00:00

Project Name: UNIFIRST WELLS G&H
Project Number: MA000989.0002.00003

Lab Number: L1108885
Report Date: 07/05/11

Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet all of the requirements of NELAC, for all NELAC accredited parameters. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively. When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

Please see the associated ADEx data file for a comparison of laboratory reporting limits that were achieved with the regulatory Numerical Standards requested on the Chain of Custody.

For additional information, please contact Client Services at 800-624-9220.

The canister certification results are provided as an addendum.

Volatile Organics in Air (SIM)

1,2-Dibromoethane, Bromodichloromethane and Naphthalene were evaluated to 1/2 the RL and are J qualified if the concentration is below the quantitation limit (RDL), but greater than or equal to 1/2 the RDL.

Values are estimated.

L1108885-08, -09 and -10 have elevated detection limits due to the dilution required by the elevated concentrations of target compounds in the samples. The samples were re-analyzed on dilution in order to quantitate the samples within the calibration range. The result should be considered estimated, and is qualified with an E flag, for any compound that exceeded the calibration on the initial analysis. The re-analysis were performed only for the compound that exceeded the calibration range.

Project Name: UNIFIRST WELLS G&H
Project Number: MA000989.0002.00003

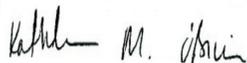
Lab Number: L1108885
Report Date: 07/05/11

Case Narrative (continued)

L1108885-11: Prior to sample analysis, the canister was pressurized with UHP Nitrogen due to low sample volume. The pressurization resulted in a dilution of the sample. The reporting limits have been elevated accordingly.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature:



Kathleen O'Brien

Title: Technical Director/Representative

Date: 07/05/11

AIR

Project Name: UNIFIRST WELLS G&H**Lab Number:** L1108885**Project Number:** MA000989.0002.00003**Report Date:** 07/05/11**SAMPLE RESULTS**

Lab ID: L1108885-01
 Client ID: TB06182011
 Sample Location: WOBURN, MA
 Matrix: Air
 Analytical Method: 48,TO-15-SIM
 Analytical Date: 06/29/11 16:41
 Analyst: RY

Date Collected: 06/18/11 00:00
 Date Received: 06/20/11
 Field Prep: Not Specified

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air by SIM - Mansfield Lab								
1,1,1-Trichloroethane	ND	0.020	0.020	ND	0.109	0.109		1
1,1,2-Trichloroethane	ND	0.020	0.020	ND	0.109	0.109		1
1,1-Dichloroethane	ND	0.020	0.020	ND	0.081	0.081		1
1,1-Dichloroethene	ND	0.020	0.020	ND	0.079	0.079		1
1,2,4-Trimethylbenzene	ND	0.020	0.020	ND	0.098	0.098		1
1,2-Dibromoethane	ND	0.020	0.010	ND	0.154	0.077		1
1,2-Dichloroethane	ND	0.020	0.020	ND	0.081	0.081		1
1,2-Dichloropropane	ND	0.020	0.020	ND	0.092	0.092		1
1,3-Butadiene	ND	0.020	0.020	ND	0.044	0.044		1
1,3-Dichlorobenzene	ND	0.020	0.020	ND	0.120	0.120		1
1,4-Dichlorobenzene	ND	0.020	0.020	ND	0.120	0.120		1
Benzene	ND	0.070	0.070	ND	0.224	0.224		1
Bromodichloromethane	ND	0.020	0.010	ND	0.134	0.067		1
Bromoform	ND	0.020	0.020	ND	0.207	0.207		1
Carbon tetrachloride	ND	0.020	0.020	ND	0.126	0.126		1
Chlorobenzene	ND	0.020	0.020	ND	0.092	0.092		1
Chloroform	ND	0.020	0.020	ND	0.098	0.098		1
cis-1,2-Dichloroethene	ND	0.020	0.020	ND	0.079	0.079		1
Ethylbenzene	ND	0.020	0.020	ND	0.087	0.087		1
Methylene chloride	ND	0.500	0.500	ND	1.74	1.74		1
Methyl tert butyl ether	ND	0.020	0.020	ND	0.072	0.072		1
Naphthalene	ND	0.050	0.025	ND	0.262	0.131		1
Xylenes, Total	ND	0.060	0.060	ND	0.261	0.261		1
Tetrachloroethene	ND	0.020	0.020	ND	0.136	0.136		1
Toluene	ND	0.050	0.050	ND	0.188	0.188		1



Project Name: UNIFIRST WELLS G&H**Lab Number:** L1108885**Project Number:** MA000989.0002.00003**Report Date:** 07/05/11**SAMPLE RESULTS**

Lab ID: L1108885-01
 Client ID: TB06182011
 Sample Location: WOBURN, MA

Date Collected: 06/18/11 00:00
 Date Received: 06/20/11
 Field Prep: Not Specified

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air by SIM - Mansfield Lab								
trans-1,2-Dichloroethene	ND	0.020	0.020	ND	0.079	0.079		1
trans-1,3-Dichloropropene	ND	0.020	0.020	ND	0.091	0.091		1
Trichloroethene	ND	0.020	0.020	ND	0.107	0.107		1
Vinyl chloride	ND	0.020	0.020	ND	0.051	0.051		1
Isopropylbenzene	ND	0.500	0.500	ND	2.46	2.46		1

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-difluorobenzene	117		60-140
bromochloromethane	100		60-140
chlorobenzene-d5	100		60-140



Project Name: UNIFIRST WELLS G&H**Lab Number:** L1108885**Project Number:** MA000989.0002.00003**Report Date:** 07/05/11**SAMPLE RESULTS**

Lab ID: L1108885-02
 Client ID: AA-CP-1-06182011
 Sample Location: WOBURN, MA
 Matrix: Air
 Analytical Method: 48,TO-15-SIM
 Analytical Date: 06/29/11 19:34
 Analyst: RY

Date Collected: 06/18/11 14:54
 Date Received: 06/20/11
 Field Prep: Not Specified

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air by SIM - Mansfield Lab								
1,1,1-Trichloroethane	ND	0.020	0.020	ND	0.109	0.109		1
1,1,2-Trichloroethane	ND	0.020	0.020	ND	0.109	0.109		1
1,1-Dichloroethane	ND	0.020	0.020	ND	0.081	0.081		1
1,1-Dichloroethene	ND	0.020	0.020	ND	0.079	0.079		1
1,2,4-Trimethylbenzene	0.049	0.020	0.020	0.241	0.098	0.098		1
1,2-Dibromoethane	ND	0.020	0.010	ND	0.154	0.077		1
1,2-Dichloroethane	ND	0.020	0.020	ND	0.081	0.081		1
1,2-Dichloropropane	ND	0.020	0.020	ND	0.092	0.092		1
1,3-Butadiene	ND	0.020	0.020	ND	0.044	0.044		1
1,3-Dichlorobenzene	ND	0.020	0.020	ND	0.120	0.120		1
1,4-Dichlorobenzene	ND	0.020	0.020	ND	0.120	0.120		1
Benzene	ND	0.070	0.070	ND	0.224	0.224		1
Bromodichloromethane	ND	0.020	0.010	ND	0.134	0.067		1
Bromoform	ND	0.020	0.020	ND	0.207	0.207		1
Carbon tetrachloride	0.071	0.020	0.020	0.447	0.126	0.126		1
Chlorobenzene	ND	0.020	0.020	ND	0.092	0.092		1
Chloroform	ND	0.020	0.020	ND	0.098	0.098		1
cis-1,2-Dichloroethene	ND	0.020	0.020	ND	0.079	0.079		1
Ethylbenzene	0.021	0.020	0.020	0.091	0.087	0.087		1
Methylene chloride	0.948	0.500	0.500	3.29	1.74	1.74		1
Methyl tert butyl ether	ND	0.020	0.020	ND	0.072	0.072		1
Naphthalene	0.545	0.050	0.025	2.86	0.262	0.131		1
Xylenes, Total	0.076	0.060	0.060	0.330	0.261	0.261		1
Tetrachloroethene	ND	0.020	0.020	ND	0.136	0.136		1
Toluene	0.169	0.050	0.050	0.637	0.188	0.188		1



Project Name: UNIFIRST WELLS G&H**Lab Number:** L1108885**Project Number:** MA000989.0002.00003**Report Date:** 07/05/11**SAMPLE RESULTS**

Lab ID: L1108885-02

Date Collected: 06/18/11 14:54

Client ID: AA-CP-1-06182011

Date Received: 06/20/11

Sample Location: WOBURN, MA

Field Prep: Not Specified

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air by SIM - Mansfield Lab								
trans-1,2-Dichloroethene	ND	0.020	0.020	ND	0.079	0.079		1
trans-1,3-Dichloropropene	ND	0.020	0.020	ND	0.091	0.091		1
Trichloroethene	ND	0.020	0.020	ND	0.107	0.107		1
Vinyl chloride	ND	0.020	0.020	ND	0.051	0.051		1
Isopropylbenzene	ND	0.500	0.500	ND	2.46	2.46		1

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-difluorobenzene	128		60-140
bromochloromethane	100		60-140
chlorobenzene-d5	110		60-140

Project Name: UNIFIRST WELLS G&H**Lab Number:** L1108885**Project Number:** MA000989.0002.00003**Report Date:** 07/05/11**SAMPLE RESULTS**

Lab ID: L1108885-03
 Client ID: AA-CP-2-06182011
 Sample Location: WOBURN, MA
 Matrix: Air
 Analytical Method: 48,TO-15-SIM
 Analytical Date: 06/29/11 20:08
 Analyst: RY

Date Collected: 06/18/11 14:52
 Date Received: 06/20/11
 Field Prep: Not Specified

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air by SIM - Mansfield Lab								
1,1,1-Trichloroethane	ND	0.020	0.020	ND	0.109	0.109		1
1,1,2-Trichloroethane	ND	0.020	0.020	ND	0.109	0.109		1
1,1-Dichloroethane	ND	0.020	0.020	ND	0.081	0.081		1
1,1-Dichloroethene	ND	0.020	0.020	ND	0.079	0.079		1
1,2,4-Trimethylbenzene	0.029	0.020	0.020	0.142	0.098	0.098		1
1,2-Dibromoethane	ND	0.020	0.010	ND	0.154	0.077		1
1,2-Dichloroethane	ND	0.020	0.020	ND	0.081	0.081		1
1,2-Dichloropropane	ND	0.020	0.020	ND	0.092	0.092		1
1,3-Butadiene	ND	0.020	0.020	ND	0.044	0.044		1
1,3-Dichlorobenzene	ND	0.020	0.020	ND	0.120	0.120		1
1,4-Dichlorobenzene	ND	0.020	0.020	ND	0.120	0.120		1
Benzene	ND	0.070	0.070	ND	0.224	0.224		1
Bromodichloromethane	ND	0.020	0.010	ND	0.134	0.067		1
Bromoform	ND	0.020	0.020	ND	0.207	0.207		1
Carbon tetrachloride	0.073	0.020	0.020	0.459	0.126	0.126		1
Chlorobenzene	ND	0.020	0.020	ND	0.092	0.092		1
Chloroform	ND	0.020	0.020	ND	0.098	0.098		1
cis-1,2-Dichloroethene	ND	0.020	0.020	ND	0.079	0.079		1
Ethylbenzene	ND	0.020	0.020	ND	0.087	0.087		1
Methylene chloride	1.14	0.500	0.500	3.96	1.74	1.74		1
Methyl tert butyl ether	ND	0.020	0.020	ND	0.072	0.072		1
Naphthalene	0.030	0.050	0.025	0.157	0.262	0.131	J	1
Xylenes, Total	0.070	0.060	0.060	0.304	0.261	0.261		1
Tetrachloroethene	ND	0.020	0.020	ND	0.136	0.136		1
Toluene	0.192	0.050	0.050	0.724	0.188	0.188		1



Project Name: UNIFIRST WELLS G&H**Lab Number:** L1108885**Project Number:** MA000989.0002.00003**Report Date:** 07/05/11**SAMPLE RESULTS**

Lab ID: L1108885-03

Date Collected: 06/18/11 14:52

Client ID: AA-CP-2-06182011

Date Received: 06/20/11

Sample Location: WOBURN, MA

Field Prep: Not Specified

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air by SIM - Mansfield Lab								
trans-1,2-Dichloroethene	ND	0.020	0.020	ND	0.079	0.079		1
trans-1,3-Dichloropropene	ND	0.020	0.020	ND	0.091	0.091		1
Trichloroethene	ND	0.020	0.020	ND	0.107	0.107		1
Vinyl chloride	ND	0.020	0.020	ND	0.051	0.051		1
Isopropylbenzene	ND	0.500	0.500	ND	2.46	2.46		1

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-difluorobenzene	121		60-140
bromochloromethane	100		60-140
chlorobenzene-d5	100		60-140

Project Name: UNIFIRST WELLS G&H**Lab Number:** L1108885**Project Number:** MA000989.0002.00003**Report Date:** 07/05/11**SAMPLE RESULTS**

Lab ID: L1108885-04
 Client ID: IA-CP-1-06182011
 Sample Location: WOBURN, MA
 Matrix: Air
 Analytical Method: 48,TO-15-SIM
 Analytical Date: 06/29/11 20:42
 Analyst: RY

Date Collected: 06/18/11 15:03
 Date Received: 06/20/11
 Field Prep: Not Specified

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air by SIM - Mansfield Lab								
1,1,1-Trichloroethane	0.020	0.020	0.020	0.109	0.109	0.109		1
1,1,2-Trichloroethane	ND	0.020	0.020	ND	0.109	0.109		1
1,1-Dichloroethane	ND	0.020	0.020	ND	0.081	0.081		1
1,1-Dichloroethene	ND	0.020	0.020	ND	0.079	0.079		1
1,2,4-Trimethylbenzene	0.433	0.020	0.020	2.13	0.098	0.098		1
1,2-Dibromoethane	ND	0.020	0.010	ND	0.154	0.077		1
1,2-Dichloroethane	0.076	0.020	0.020	0.308	0.081	0.081		1
1,2-Dichloropropane	ND	0.020	0.020	ND	0.092	0.092		1
1,3-Butadiene	0.035	0.020	0.020	0.077	0.044	0.044		1
1,3-Dichlorobenzene	ND	0.020	0.020	ND	0.120	0.120		1
1,4-Dichlorobenzene	0.030	0.020	0.020	0.180	0.120	0.120		1
Benzene	0.995	0.070	0.070	3.18	0.224	0.224		1
Bromodichloromethane	0.047	0.020	0.010	0.315	0.134	0.067		1
Bromoform	ND	0.020	0.020	ND	0.207	0.207		1
Carbon tetrachloride	0.112	0.020	0.020	0.704	0.126	0.126		1
Chlorobenzene	ND	0.020	0.020	ND	0.092	0.092		1
Chloroform	1.08	0.020	0.020	5.27	0.098	0.098		1
cis-1,2-Dichloroethene	ND	0.020	0.020	ND	0.079	0.079		1
Ethylbenzene	0.799	0.020	0.020	3.47	0.087	0.087		1
Methylene chloride	1.96	0.500	0.500	6.81	1.74	1.74		1
Methyl tert butyl ether	ND	0.020	0.020	ND	0.072	0.072		1
Naphthalene	0.115	0.050	0.025	0.603	0.262	0.131		1
Xylenes, Total	4.33	0.060	0.060	18.8	0.261	0.261		1
Tetrachloroethene	0.161	0.020	0.020	1.09	0.136	0.136		1
Toluene	7.40	0.050	0.050	27.9	0.188	0.188		1



Project Name: UNIFIRST WELLS G&H**Lab Number:** L1108885**Project Number:** MA000989.0002.00003**Report Date:** 07/05/11**SAMPLE RESULTS**

Lab ID: L1108885-04

Date Collected: 06/18/11 15:03

Client ID: IA-CP-1-06182011

Date Received: 06/20/11

Sample Location: WOBURN, MA

Field Prep: Not Specified

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air by SIM - Mansfield Lab								
trans-1,2-Dichloroethene	ND	0.020	0.020	ND	0.079	0.079		1
trans-1,3-Dichloropropene	ND	0.020	0.020	ND	0.091	0.091		1
Trichloroethene	ND	0.020	0.020	ND	0.107	0.107		1
Vinyl chloride	ND	0.020	0.020	ND	0.051	0.051		1
Isopropylbenzene	ND	0.500	0.500	ND	2.46	2.46		1

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-difluorobenzene	117		60-140
bromochloromethane	98		60-140
chlorobenzene-d5	103		60-140

Project Name: UNIFIRST WELLS G&H**Lab Number:** L1108885**Project Number:** MA000989.0002.00003**Report Date:** 07/05/11**SAMPLE RESULTS**

Lab ID: L1108885-05
 Client ID: IA-CP-2-06182011
 Sample Location: WOBURN, MA
 Matrix: Air
 Analytical Method: 48,TO-15-SIM
 Analytical Date: 06/29/11 21:16
 Analyst: RY

Date Collected: 06/18/11 14:56
 Date Received: 06/20/11
 Field Prep: Not Specified

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air by SIM - Mansfield Lab								
1,1,1-Trichloroethane	0.020	0.020	0.020	0.109	0.109	0.109		1
1,1,2-Trichloroethane	ND	0.020	0.020	ND	0.109	0.109		1
1,1-Dichloroethane	ND	0.020	0.020	ND	0.081	0.081		1
1,1-Dichloroethene	ND	0.020	0.020	ND	0.079	0.079		1
1,2,4-Trimethylbenzene	0.468	0.020	0.020	2.30	0.098	0.098		1
1,2-Dibromoethane	ND	0.020	0.010	ND	0.154	0.077		1
1,2-Dichloroethane	ND	0.020	0.020	ND	0.081	0.081		1
1,2-Dichloropropane	ND	0.020	0.020	ND	0.092	0.092		1
1,3-Butadiene	0.045	0.020	0.020	0.10	0.044	0.044		1
1,3-Dichlorobenzene	ND	0.020	0.020	ND	0.120	0.120		1
1,4-Dichlorobenzene	0.028	0.020	0.020	0.168	0.120	0.120		1
Benzene	1.00	0.070	0.070	3.19	0.224	0.224		1
Bromodichloromethane	0.049	0.020	0.010	0.328	0.134	0.067		1
Bromoform	ND	0.020	0.020	ND	0.207	0.207		1
Carbon tetrachloride	0.108	0.020	0.020	0.679	0.126	0.126		1
Chlorobenzene	ND	0.020	0.020	ND	0.092	0.092		1
Chloroform	1.05	0.020	0.020	5.13	0.098	0.098		1
cis-1,2-Dichloroethene	ND	0.020	0.020	ND	0.079	0.079		1
Ethylbenzene	0.820	0.020	0.020	3.56	0.087	0.087		1
Methylene chloride	0.940	0.500	0.500	3.26	1.74	1.74		1
Methyl tert butyl ether	ND	0.020	0.020	ND	0.072	0.072		1
Naphthalene	0.112	0.050	0.025	0.587	0.262	0.131		1
Xylenes, Total	4.37	0.060	0.060	19.0	0.261	0.261		1
Tetrachloroethene	0.167	0.020	0.020	1.13	0.136	0.136		1
Toluene	7.69	0.050	0.050	29.0	0.188	0.188		1



Project Name: UNIFIRST WELLS G&H**Lab Number:** L1108885**Project Number:** MA000989.0002.00003**Report Date:** 07/05/11**SAMPLE RESULTS**

Lab ID: L1108885-05

Date Collected: 06/18/11 14:56

Client ID: IA-CP-2-06182011

Date Received: 06/20/11

Sample Location: WOBURN, MA

Field Prep: Not Specified

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air by SIM - Mansfield Lab								
trans-1,2-Dichloroethene	ND	0.020	0.020	ND	0.079	0.079		1
trans-1,3-Dichloropropene	ND	0.020	0.020	ND	0.091	0.091		1
Trichloroethene	ND	0.020	0.020	ND	0.107	0.107		1
Vinyl chloride	ND	0.020	0.020	ND	0.051	0.051		1
Isopropylbenzene	ND	0.500	0.500	ND	2.46	2.46		1

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-difluorobenzene	126		60-140
bromochloromethane	101		60-140
chlorobenzene-d5	110		60-140



Project Name: UNIFIRST WELLS G&H**Lab Number:** L1108885**Project Number:** MA000989.0002.00003**Report Date:** 07/05/11**SAMPLE RESULTS**

Lab ID: L1108885-06
 Client ID: DUPIA06182011
 Sample Location: WOBURN, MA
 Matrix: Air
 Analytical Method: 48,TO-15-SIM
 Analytical Date: 06/29/11 21:50
 Analyst: RY

Date Collected: 06/18/11 00:00
 Date Received: 06/20/11
 Field Prep: Not Specified

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air by SIM - Mansfield Lab								
1,1,1-Trichloroethane	ND	0.020	0.020	ND	0.109	0.109		1
1,1,2-Trichloroethane	ND	0.020	0.020	ND	0.109	0.109		1
1,1-Dichloroethane	ND	0.020	0.020	ND	0.081	0.081		1
1,1-Dichloroethene	ND	0.020	0.020	ND	0.079	0.079		1
1,2,4-Trimethylbenzene	0.543	0.020	0.020	2.67	0.098	0.098		1
1,2-Dibromoethane	ND	0.020	0.010	ND	0.154	0.077		1
1,2-Dichloroethane	ND	0.020	0.020	ND	0.081	0.081		1
1,2-Dichloropropane	ND	0.020	0.020	ND	0.092	0.092		1
1,3-Butadiene	0.045	0.020	0.020	0.10	0.044	0.044		1
1,3-Dichlorobenzene	ND	0.020	0.020	ND	0.120	0.120		1
1,4-Dichlorobenzene	0.031	0.020	0.020	0.186	0.120	0.120		1
Benzene	0.982	0.070	0.070	3.14	0.224	0.224		1
Bromodichloromethane	0.047	0.020	0.010	0.315	0.134	0.067		1
Bromoform	ND	0.020	0.020	ND	0.207	0.207		1
Carbon tetrachloride	0.105	0.020	0.020	0.660	0.126	0.126		1
Chlorobenzene	ND	0.020	0.020	ND	0.092	0.092		1
Chloroform	0.981	0.020	0.020	4.79	0.098	0.098		1
cis-1,2-Dichloroethene	ND	0.020	0.020	ND	0.079	0.079		1
Ethylbenzene	0.848	0.020	0.020	3.68	0.087	0.087		1
Methylene chloride	0.864	0.500	0.500	3.00	1.74	1.74		1
Methyl tert butyl ether	ND	0.020	0.020	ND	0.072	0.072		1
Naphthalene	0.098	0.050	0.025	0.514	0.262	0.131		1
Xylenes, Total	4.58	0.060	0.060	19.9	0.261	0.261		1
Tetrachloroethene	0.182	0.020	0.020	1.23	0.136	0.136		1
Toluene	7.21	0.050	0.050	27.2	0.188	0.188		1



Project Name: UNIFIRST WELLS G&H**Lab Number:** L1108885**Project Number:** MA000989.0002.00003**Report Date:** 07/05/11**SAMPLE RESULTS**

Lab ID: L1108885-06

Date Collected: 06/18/11 00:00

Client ID: DUPIA06182011

Date Received: 06/20/11

Sample Location: WOBURN, MA

Field Prep: Not Specified

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air by SIM - Mansfield Lab								
trans-1,2-Dichloroethene	ND	0.020	0.020	ND	0.079	0.079		1
trans-1,3-Dichloropropene	ND	0.020	0.020	ND	0.091	0.091		1
Trichloroethene	ND	0.020	0.020	ND	0.107	0.107		1
Vinyl chloride	ND	0.020	0.020	ND	0.051	0.051		1
Isopropylbenzene	ND	0.500	0.500	ND	2.46	2.46		1

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-difluorobenzene	134		60-140
bromochloromethane	112		60-140
chlorobenzene-d5	109		60-140



Project Name: UNIFIRST WELLS G&H**Lab Number:** L1108885**Project Number:** MA000989.0002.00003**Report Date:** 07/05/11**SAMPLE RESULTS**

Lab ID: L1108885-07
 Client ID: IA-CP-3-06182011
 Sample Location: WOBURN, MA
 Matrix: Air
 Analytical Method: 48,TO-15-SIM
 Analytical Date: 06/29/11 22:24
 Analyst: RY

Date Collected: 06/18/11 15:03
 Date Received: 06/20/11
 Field Prep: Not Specified

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air by SIM - Mansfield Lab								
1,1,1-Trichloroethane	ND	0.020	0.020	ND	0.109	0.109		1
1,1,2-Trichloroethane	ND	0.020	0.020	ND	0.109	0.109		1
1,1-Dichloroethane	ND	0.020	0.020	ND	0.081	0.081		1
1,1-Dichloroethene	ND	0.020	0.020	ND	0.079	0.079		1
1,2,4-Trimethylbenzene	0.548	0.020	0.020	2.69	0.098	0.098		1
1,2-Dibromoethane	ND	0.020	0.010	ND	0.154	0.077		1
1,2-Dichloroethane	0.091	0.020	0.020	0.368	0.081	0.081		1
1,2-Dichloropropane	ND	0.020	0.020	ND	0.092	0.092		1
1,3-Butadiene	0.035	0.020	0.020	0.077	0.044	0.044		1
1,3-Dichlorobenzene	ND	0.020	0.020	ND	0.120	0.120		1
1,4-Dichlorobenzene	0.028	0.020	0.020	0.168	0.120	0.120		1
Benzene	0.960	0.070	0.070	3.07	0.224	0.224		1
Bromodichloromethane	0.047	0.020	0.010	0.315	0.134	0.067		1
Bromoform	ND	0.020	0.020	ND	0.207	0.207		1
Carbon tetrachloride	0.108	0.020	0.020	0.679	0.126	0.126		1
Chlorobenzene	ND	0.020	0.020	ND	0.092	0.092		1
Chloroform	1.14	0.020	0.020	5.57	0.098	0.098		1
cis-1,2-Dichloroethene	ND	0.020	0.020	ND	0.079	0.079		1
Ethylbenzene	0.823	0.020	0.020	3.57	0.087	0.087		1
Methylene chloride	0.831	0.500	0.500	2.89	1.74	1.74		1
Methyl tert butyl ether	ND	0.020	0.020	ND	0.072	0.072		1
Naphthalene	0.115	0.050	0.025	0.603	0.262	0.131		1
Xylenes, Total	4.44	0.060	0.060	19.3	0.261	0.261		1
Tetrachloroethene	0.176	0.020	0.020	1.19	0.136	0.136		1
Toluene	7.17	0.050	0.050	27.0	0.188	0.188		1



Project Name: UNIFIRST WELLS G&H**Lab Number:** L1108885**Project Number:** MA000989.0002.00003**Report Date:** 07/05/11**SAMPLE RESULTS**

Lab ID: L1108885-07

Date Collected: 06/18/11 15:03

Client ID: IA-CP-3-06182011

Date Received: 06/20/11

Sample Location: WOBURN, MA

Field Prep: Not Specified

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air by SIM - Mansfield Lab								
trans-1,2-Dichloroethene	ND	0.020	0.020	ND	0.079	0.079		1
trans-1,3-Dichloropropene	ND	0.020	0.020	ND	0.091	0.091		1
Trichloroethene	ND	0.020	0.020	ND	0.107	0.107		1
Vinyl chloride	ND	0.020	0.020	ND	0.051	0.051		1
Isopropylbenzene	ND	0.500	0.500	ND	2.46	2.46		1

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-difluorobenzene	126		60-140
bromochloromethane	117		60-140
chlorobenzene-d5	114		60-140

Project Name: UNIFIRST WELLS G&H**Lab Number:** L1108885**Project Number:** MA000989.0002.00003**Report Date:** 07/05/11**SAMPLE RESULTS**

Lab ID: L1108885-08 D
 Client ID: SS-CP-1-06182011
 Sample Location: WOBURN, MA
 Matrix: Soil_Vapor
 Analytical Method: 48,TO-15-SIM
 Analytical Date: 06/30/11 00:41
 Analyst: RY

Date Collected: 06/18/11 16:38
 Date Received: 06/20/11
 Field Prep: Not Specified

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air by SIM - Mansfield Lab								
1,1,1-Trichloroethane	1.54	0.040	0.040	8.40	0.218	0.218		2
1,1,2-Trichloroethane	ND	0.040	0.040	ND	0.218	0.218		2
1,1-Dichloroethane	0.128	0.040	0.040	0.518	0.162	0.162		2
1,1-Dichloroethene	ND	0.040	0.040	ND	0.158	0.158		2
1,2,4-Trimethylbenzene	ND	0.040	0.040	ND	0.197	0.197		2
1,2-Dibromoethane	ND	0.040	0.020	ND	0.307	0.154		2
1,2-Dichloroethane	ND	0.040	0.040	ND	0.162	0.162		2
1,2-Dichloropropane	ND	0.040	0.040	ND	0.185	0.185		2
1,3-Butadiene	ND	0.040	0.040	ND	0.089	0.089		2
1,3-Dichlorobenzene	ND	0.040	0.040	ND	0.240	0.240		2
1,4-Dichlorobenzene	ND	0.040	0.040	ND	0.240	0.240		2
Benzene	ND	0.140	0.140	ND	0.447	0.447		2
Bromodichloromethane	0.384	0.040	0.020	2.57	0.268	0.134		2
Bromoform	ND	0.040	0.040	ND	0.414	0.414		2
Carbon tetrachloride	ND	0.040	0.040	ND	0.252	0.252		2
Chlorobenzene	ND	0.040	0.040	ND	0.184	0.184		2
Chloroform	12.0	0.040	0.040	58.6	0.195	0.195		2
cis-1,2-Dichloroethene	0.072	0.040	0.040	0.285	0.158	0.158		2
Ethylbenzene	ND	0.040	0.040	ND	0.174	0.174		2
Methylene chloride	ND	1.00	1.00	ND	3.47	3.47		2
Methyl tert butyl ether	ND	0.040	0.040	ND	0.144	0.144		2
Naphthalene	ND	0.100	0.050	ND	0.524	0.262		2
Xylenes, Total	ND	0.120	0.120	ND	0.521	0.521		2
Tetrachloroethene	172	0.040	0.040	1170	0.271	0.271	E	2
Toluene	ND	0.100	0.100	ND	0.377	0.377		2



Project Name: UNIFIRST WELLS G&H**Lab Number:** L1108885**Project Number:** MA000989.0002.00003**Report Date:** 07/05/11**SAMPLE RESULTS**

Lab ID: L1108885-08 D

Date Collected: 06/18/11 16:38

Client ID: SS-CP-1-06182011

Date Received: 06/20/11

Sample Location: WOBURN, MA

Field Prep: Not Specified

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air by SIM - Mansfield Lab								
trans-1,2-Dichloroethene	0.072	0.040	0.040	0.285	0.158	0.158		2
trans-1,3-Dichloropropene	ND	0.040	0.040	ND	0.182	0.182		2
Trichloroethene	4.78	0.040	0.040	25.7	0.215	0.215		2
Vinyl chloride	ND	0.040	0.040	ND	0.102	0.102		2
Isopropylbenzene	ND	1.00	1.00	ND	4.92	4.92		2

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-difluorobenzene	101		60-140
bromochloromethane	103		60-140
chlorobenzene-d5	106		60-140

Project Name: UNIFIRST WELLS G&H**Lab Number:** L1108885**Project Number:** MA000989.0002.00003**Report Date:** 07/05/11**SAMPLE RESULTS**

Lab ID: L1108885-08 D2

Date Collected: 06/18/11 16:38

Client ID: SS-CP-1-06182011

Date Received: 06/20/11

Sample Location: WOBURN, MA

Field Prep: Not Specified

Matrix: Soil_Vapor

Analytical Method: 48,TO-15-SIM

Analytical Date: 06/30/11 10:13

Analyst: RY

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air by SIM - Mansfield Lab								
Tetrachloroethene	163	0.100	0.100	1100	0.678	0.678		5

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-difluorobenzene	95		60-140
bromochloromethane	74		60-140
chlorobenzene-d5	92		60-140

Project Name: UNIFIRST WELLS G&H**Lab Number:** L1108885**Project Number:** MA000989.0002.00003**Report Date:** 07/05/11**SAMPLE RESULTS**

Lab ID: L1108885-09 D
 Client ID: SS-CP-2-06182011
 Sample Location: WOBURN, MA
 Matrix: Soil_Vapor
 Analytical Method: 48,TO-15-SIM
 Analytical Date: 06/30/11 01:14
 Analyst: RY

Date Collected: 06/18/11 15:46
 Date Received: 06/20/11
 Field Prep: Not Specified

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air by SIM - Mansfield Lab								
1,1,1-Trichloroethane	7.00	0.200	0.200	38.2	1.09	1.09		10
1,1,2-Trichloroethane	ND	0.200	0.200	ND	1.09	1.09		10
1,1-Dichloroethane	ND	0.200	0.200	ND	0.809	0.809		10
1,1-Dichloroethene	ND	0.200	0.200	ND	0.793	0.793		10
1,2,4-Trimethylbenzene	ND	0.200	0.200	ND	0.983	0.983		10
1,2-Dibromoethane	ND	0.200	0.100	ND	1.54	0.768		10
1,2-Dichloroethane	ND	0.200	0.200	ND	0.809	0.809		10
1,2-Dichloropropane	ND	0.200	0.200	ND	0.924	0.924		10
1,3-Butadiene	ND	0.200	0.200	ND	0.442	0.442		10
1,3-Dichlorobenzene	ND	0.200	0.200	ND	1.20	1.20		10
1,4-Dichlorobenzene	ND	0.200	0.200	ND	1.20	1.20		10
Benzene	ND	0.700	0.700	ND	2.24	2.24		10
Bromodichloromethane	ND	0.200	0.100	ND	1.34	0.670		10
Bromoform	ND	0.200	0.200	ND	2.07	2.07		10
Carbon tetrachloride	ND	0.200	0.200	ND	1.26	1.26		10
Chlorobenzene	ND	0.200	0.200	ND	0.921	0.921		10
Chloroform	5.92	0.200	0.200	28.9	0.977	0.977		10
cis-1,2-Dichloroethene	ND	0.200	0.200	ND	0.793	0.793		10
Ethylbenzene	ND	0.200	0.200	ND	0.869	0.869		10
Methylene chloride	ND	5.00	5.00	ND	17.4	17.4		10
Methyl tert butyl ether	ND	0.200	0.200	ND	0.721	0.721		10
Naphthalene	ND	0.500	0.250	ND	2.62	1.31		10
Xylenes, Total	ND	0.600	0.600	ND	2.61	2.61		10
Tetrachloroethene	618	0.200	0.200	4190	1.36	1.36	E	10
Toluene	ND	0.500	0.500	ND	1.88	1.88		10



Project Name: UNIFIRST WELLS G&H**Lab Number:** L1108885**Project Number:** MA000989.0002.00003**Report Date:** 07/05/11**SAMPLE RESULTS**

Lab ID: L1108885-09 D

Date Collected: 06/18/11 15:46

Client ID: SS-CP-2-06182011

Date Received: 06/20/11

Sample Location: WOBURN, MA

Field Prep: Not Specified

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air by SIM - Mansfield Lab								
trans-1,2-Dichloroethene	ND	0.200	0.200	ND	0.793	0.793		10
trans-1,3-Dichloropropene	ND	0.200	0.200	ND	0.908	0.908		10
Trichloroethene	0.830	0.200	0.200	4.46	1.07	1.07		10
Vinyl chloride	ND	0.200	0.200	ND	0.511	0.511		10
Isopropylbenzene	ND	5.00	5.00	ND	24.6	24.6		10

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-difluorobenzene	112		60-140
bromochloromethane	107		60-140
chlorobenzene-d5	121		60-140



Project Name: UNIFIRST WELLS G&H**Lab Number:** L1108885**Project Number:** MA000989.0002.00003**Report Date:** 07/05/11**SAMPLE RESULTS**

Lab ID: L1108885-09 D2
 Client ID: SS-CP-2-06182011
 Sample Location: WOBURN, MA
 Matrix: Soil_Vapor
 Analytical Method: 48,TO-15-SIM
 Analytical Date: 06/30/11 10:47
 Analyst: RY

Date Collected: 06/18/11 15:46
 Date Received: 06/20/11
 Field Prep: Not Specified

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air by SIM - Mansfield Lab								
Tetrachloroethene	845	0.361	0.361	5730	2.45	2.45		18.05

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-difluorobenzene	107		60-140
bromochloromethane	101		60-140
chlorobenzene-d5	103		60-140

Project Name: UNIFIRST WELLS G&H**Lab Number:** L1108885**Project Number:** MA000989.0002.00003**Report Date:** 07/05/11**SAMPLE RESULTS**

Lab ID: L1108885-10 D
 Client ID: SS-CP-3-06182011
 Sample Location: WOBURN, MA
 Matrix: Soil_Vapor
 Analytical Method: 48,TO-15-SIM
 Analytical Date: 06/30/11 01:47
 Analyst: RY

Date Collected: 06/18/11 15:59
 Date Received: 06/20/11
 Field Prep: Not Specified

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air by SIM - Mansfield Lab								
1,1,1-Trichloroethane	2.22	0.040	0.040	12.1	0.218	0.218		2
1,1,2-Trichloroethane	ND	0.040	0.040	ND	0.218	0.218		2
1,1-Dichloroethane	ND	0.040	0.040	ND	0.162	0.162		2
1,1-Dichloroethene	ND	0.040	0.040	ND	0.158	0.158		2
1,2,4-Trimethylbenzene	ND	0.040	0.040	ND	0.197	0.197		2
1,2-Dibromoethane	ND	0.040	0.020	ND	0.307	0.154		2
1,2-Dichloroethane	ND	0.040	0.040	ND	0.162	0.162		2
1,2-Dichloropropane	ND	0.040	0.040	ND	0.185	0.185		2
1,3-Butadiene	ND	0.040	0.040	ND	0.089	0.089		2
1,3-Dichlorobenzene	ND	0.040	0.040	ND	0.240	0.240		2
1,4-Dichlorobenzene	ND	0.040	0.040	ND	0.240	0.240		2
Benzene	ND	0.140	0.140	ND	0.447	0.447		2
Bromodichloromethane	0.072	0.040	0.020	0.482	0.268	0.134		2
Bromoform	ND	0.040	0.040	ND	0.414	0.414		2
Carbon tetrachloride	0.048	0.040	0.040	0.302	0.252	0.252		2
Chlorobenzene	ND	0.040	0.040	ND	0.184	0.184		2
Chloroform	6.70	0.040	0.040	32.7	0.195	0.195		2
cis-1,2-Dichloroethene	ND	0.040	0.040	ND	0.158	0.158		2
Ethylbenzene	ND	0.040	0.040	ND	0.174	0.174		2
Methylene chloride	ND	1.00	1.00	ND	3.47	3.47		2
Methyl tert butyl ether	ND	0.040	0.040	ND	0.144	0.144		2
Naphthalene	ND	0.100	0.050	ND	0.524	0.262		2
Xylenes, Total	ND	0.120	0.120	ND	0.521	0.521		2
Tetrachloroethene	162	0.040	0.040	1100	0.271	0.271	E	2
Toluene	ND	0.100	0.100	ND	0.377	0.377		2



Project Name: UNIFIRST WELLS G&H**Lab Number:** L1108885**Project Number:** MA000989.0002.00003**Report Date:** 07/05/11**SAMPLE RESULTS**

Lab ID: L1108885-10 D

Date Collected: 06/18/11 15:59

Client ID: SS-CP-3-06182011

Date Received: 06/20/11

Sample Location: WOBURN, MA

Field Prep: Not Specified

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air by SIM - Mansfield Lab								
trans-1,2-Dichloroethene	ND	0.040	0.040	ND	0.158	0.158		2
trans-1,3-Dichloropropene	ND	0.040	0.040	ND	0.182	0.182		2
Trichloroethene	0.132	0.040	0.040	0.709	0.215	0.215		2
Vinyl chloride	ND	0.040	0.040	ND	0.102	0.102		2
Isopropylbenzene	ND	1.00	1.00	ND	4.92	4.92		2

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-difluorobenzene	110		60-140
bromochloromethane	109		60-140
chlorobenzene-d5	118		60-140



Project Name: UNIFIRST WELLS G&H**Lab Number:** L1108885**Project Number:** MA000989.0002.00003**Report Date:** 07/05/11**SAMPLE RESULTS**

Lab ID: L1108885-10 D2

Date Collected: 06/18/11 15:59

Client ID: SS-CP-3-06182011

Date Received: 06/20/11

Sample Location: WOBURN, MA

Field Prep: Not Specified

Matrix: Soil_Vapor

Analytical Method: 48,TO-15-SIM

Analytical Date: 06/30/11 11:20

Analyst: RY

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air by SIM - Mansfield Lab								
Tetrachloroethene	166	0.100	0.100	1120	0.678	0.678		5

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-difluorobenzene	114		60-140
bromochloromethane	101		60-140
chlorobenzene-d5	107		60-140

Project Name: UNIFIRST WELLS G&H**Lab Number:** L1108885**Project Number:** MA000989.0002.00003**Report Date:** 07/05/11**SAMPLE RESULTS**

Lab ID: L1108885-11 D
 Client ID: DUPSS06182011
 Sample Location: WOBURN, MA
 Matrix: Soil_Vapor
 Analytical Method: 48,TO-15-SIM
 Analytical Date: 06/30/11 12:43
 Analyst: RY

Date Collected: 06/18/11 00:00
 Date Received: 06/20/11
 Field Prep: Not Specified

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air by SIM - Mansfield Lab								
1,1,1-Trichloroethane	1.41	0.110	0.110	7.69	0.600	0.600		5.511
1,1,2-Trichloroethane	ND	0.110	0.110	ND	0.600	0.600		5.511
1,1-Dichloroethane	ND	0.110	0.110	ND	0.445	0.445		5.511
1,1-Dichloroethene	ND	0.110	0.110	ND	0.436	0.436		5.511
1,2,4-Trimethylbenzene	0.127	0.110	0.110	0.624	0.541	0.541		5.511
1,2-Dibromoethane	ND	0.110	0.055	ND	0.845	0.423		5.511
1,2-Dichloroethane	ND	0.110	0.110	ND	0.445	0.445		5.511
1,2-Dichloropropane	ND	0.110	0.110	ND	0.508	0.508		5.511
1,3-Butadiene	ND	0.110	0.110	ND	0.243	0.243		5.511
1,3-Dichlorobenzene	ND	0.110	0.110	ND	0.661	0.661		5.511
1,4-Dichlorobenzene	ND	0.110	0.110	ND	0.661	0.661		5.511
Benzene	ND	0.386	0.386	ND	1.23	1.23		5.511
Bromodichloromethane	0.347	0.110	0.055	2.32	0.737	0.369		5.511
Bromoform	ND	0.110	0.110	ND	1.14	1.14		5.511
Carbon tetrachloride	ND	0.110	0.110	ND	0.692	0.692		5.511
Chlorobenzene	ND	0.110	0.110	ND	0.506	0.506		5.511
Chloroform	12.0	0.110	0.110	58.6	0.537	0.537		5.511
cis-1,2-Dichloroethene	ND	0.110	0.110	ND	0.436	0.436		5.511
Ethylbenzene	ND	0.110	0.110	ND	0.478	0.478		5.511
Methylene chloride	3.26	2.76	2.76	11.3	9.59	9.59		5.511
Methyl tert butyl ether	0.226	0.110	0.110	0.815	0.396	0.396		5.511
Naphthalene	ND	0.276	0.138	ND	1.45	0.724		5.511
Xylenes, Total	ND	0.331	0.331	ND	1.44	1.44		5.511
Tetrachloroethene	175	0.110	0.110	1190	0.746	0.746		5.511
Toluene	0.325	0.276	0.276	1.22	1.04	1.04		5.511



Project Name: UNIFIRST WELLS G&H**Lab Number:** L1108885**Project Number:** MA000989.0002.00003**Report Date:** 07/05/11**SAMPLE RESULTS**

Lab ID: L1108885-11 D

Date Collected: 06/18/11 00:00

Client ID: DUPSS06182011

Date Received: 06/20/11

Sample Location: WOBURN, MA

Field Prep: Not Specified

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air by SIM - Mansfield Lab								
trans-1,2-Dichloroethene	ND	0.110	0.110	ND	0.436	0.436		5.511
trans-1,3-Dichloropropene	ND	0.110	0.110	ND	0.499	0.499		5.511
Trichloroethene	4.42	0.110	0.110	23.8	0.591	0.591		5.511
Vinyl chloride	ND	0.110	0.110	ND	0.281	0.281		5.511
Isopropylbenzene	ND	2.76	2.76	ND	13.6	13.6		5.511

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-difluorobenzene	94		60-140
bromochloromethane	86		60-140
chlorobenzene-d5	73		60-140

Project Name: UNIFIRST WELLS G&H

Lab Number: L1108885

Project Number: MA000989.0002.00003

Report Date: 07/05/11

Method Blank Analysis Batch Quality Control

Analytical Method: 48,TO-15-SIM

Analytical Date: 06/29/11 15:31

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air by SIM - Mansfield Lab for sample(s): 01-11 Batch: WG476109-4								
1,1,1-Trichloroethane	ND	0.020	0.020	ND	0.109	0.109		1
1,1,2-Trichloroethane	ND	0.020	0.020	ND	0.109	0.109		1
1,1-Dichloroethane	ND	0.020	0.020	ND	0.081	0.081		1
1,1-Dichloroethene	ND	0.020	0.020	ND	0.079	0.079		1
1,2,4-Trimethylbenzene	ND	0.020	0.020	ND	0.098	0.098		1
1,2-Dibromoethane	ND	0.020	0.010	ND	0.154	0.077		1
1,2-Dichloroethane	ND	0.020	0.020	ND	0.081	0.081		1
1,2-Dichloropropane	ND	0.020	0.020	ND	0.092	0.092		1
1,3-Butadiene	ND	0.020	0.020	ND	0.044	0.044		1
1,3-Dichlorobenzene	ND	0.020	0.020	ND	0.120	0.120		1
1,4-Dichlorobenzene	ND	0.020	0.020	ND	0.120	0.120		1
Benzene	ND	0.070	0.070	ND	0.224	0.224		1
Bromodichloromethane	ND	0.020	0.010	ND	0.134	0.067		1
Bromoform	ND	0.020	0.020	ND	0.207	0.207		1
Carbon tetrachloride	ND	0.020	0.020	ND	0.126	0.126		1
Chlorobenzene	ND	0.020	0.020	ND	0.092	0.092		1
Chloroform	ND	0.020	0.020	ND	0.098	0.098		1
cis-1,2-Dichloroethene	ND	0.020	0.020	ND	0.079	0.079		1
Ethylbenzene	ND	0.020	0.020	ND	0.087	0.087		1
Methylene chloride	ND	0.500	0.500	ND	1.74	1.74		1
Methyl tert butyl ether	ND	0.020	0.020	ND	0.072	0.072		1
Naphthalene	ND	0.050	0.025	ND	0.262	0.131		1
Xylenes, Total	ND	0.060	0.060	ND	0.261	0.261		1
Tetrachloroethene	ND	0.020	0.020	ND	0.136	0.136		1
Toluene	ND	0.050	0.050	ND	0.188	0.188		1



Project Name: UNIFIRST WELLS G&H

Lab Number: L1108885

Project Number: MA000989.0002.00003

Report Date: 07/05/11

Method Blank Analysis Batch Quality Control

Analytical Method: 48,TO-15-SIM

Analytical Date: 06/29/11 15:31

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air by SIM - Mansfield Lab for sample(s): 01-11 Batch: WG476109-4								
trans-1,2-Dichloroethene	ND	0.020	0.020	ND	0.079	0.079		1
trans-1,3-Dichloropropene	ND	0.020	0.020	ND	0.091	0.091		1
Trichloroethene	ND	0.020	0.020	ND	0.107	0.107		1
Vinyl chloride	ND	0.020	0.020	ND	0.051	0.051		1
Isopropylbenzene	ND	0.500	0.500	ND	2.46	2.46		1

Lab Control Sample Analysis

Batch Quality Control

Project Name: UNIFIRST WELLS G&H
Project Number: MA000989.0002.00003

Lab Number: L1108885
Report Date: 07/05/11

Parameter	LCS		LCSD		%Recovery Limits	RPD	Qual	RPD Limits
	%Recovery	Qual	%Recovery	Qual				
Volatile Organics in Air by SIM - Mansfield Lab Associated sample(s): 01-11 Batch: WG476109-3								
1,1,1-Trichloroethane	104		-		70-130	-		25
1,1,2-Trichloroethane	88		-		70-130	-		25
1,1-Dichloroethane	89		-		70-130	-		25
1,1-Dichloroethene	91		-		70-130	-		25
1,2,4-Trimethylbenzene	92		-		70-130	-		25
1,2-Dibromoethane	90		-		70-130	-		25
1,2-Dichloroethane	82		-		70-130	-		25
1,2-Dichloropropane	88		-		70-130	-		25
1,3-Butadiene	89		-		70-130	-		25
1,3-Dichlorobenzene	95		-		70-130	-		25
1,4-Dichlorobenzene	94		-		70-130	-		25
Benzene	78		-		70-130	-		25
Bromodichloromethane	102		-		70-130	-		25
Bromoform	96		-		70-130	-		25
Carbon tetrachloride	108		-		70-130	-		25
Chlorobenzene	83		-		70-130	-		25
Chloroform	91		-		70-130	-		25
cis-1,2-Dichloroethene	86		-		70-130	-		25
Ethylbenzene	74		-		70-130	-		25
Methylene chloride	82		-		70-130	-		25
Methyl tert butyl ether	73		-		70-130	-		25

Lab Control Sample Analysis

Batch Quality Control

Project Name: UNIFIRST WELLS G&H
Project Number: MA000989.0002.00003

Lab Number: L1108885
Report Date: 07/05/11

Parameter	LCS		LCSD		%Recovery Limits	RPD	Qual	RPD Limits
	%Recovery	Qual	%Recovery	Qual				
Volatile Organics in Air by SIM - Mansfield Lab Associated sample(s): 01-11 Batch: WG476109-3								
Naphthalene	127		-		70-130	-		25
p/m-Xylene	76		-		70-130	-		25
o-Xylene	88		-		70-130	-		25
Tetrachloroethene	92		-		70-130	-		25
Toluene	73		-		70-130	-		25
trans-1,2-Dichloroethene	83		-		70-130	-		25
trans-1,3-Dichloropropene	76		-		70-130	-		25
Trichloroethene	101		-		70-130	-		25
Vinyl chloride	89		-		70-130	-		25
Isopropylbenzene	95		-		70-130	-		25

Lab Duplicate Analysis

Batch Quality Control

Project Name: UNIFIRST WELLS G&H
Project Number: MA000989.0002.00C

Lab Number: L1108885
Report Date: 07/05/11

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Volatile Organics in Air by SIM - Mansfield Lab Associated sample(s): 01-11 QC Batch ID: WG476109-5 QC Sample: L1108884-05 Client ID: DUP Sample						
1,1,1-Trichloroethane	0.028	0.029	ppbV	4		25
1,1,2-Trichloroethane	ND	ND	ppbV	NC		25
1,1-Dichloroethane	ND	ND	ppbV	NC		25
1,1-Dichloroethene	ND	ND	ppbV	NC		25
1,2,4-Trimethylbenzene	0.024	0.021	ppbV	13		25
1,2-Dibromoethane	ND	ND	ppbV	NC		25
1,2-Dichloroethane	ND	ND	ppbV	NC		25
1,2-Dichloropropane	ND	ND	ppbV	NC		25
1,3-Butadiene	ND	ND	ppbV	NC		25
1,3-Dichlorobenzene	ND	ND	ppbV	NC		25
1,4-Dichlorobenzene	ND	ND	ppbV	NC		25
Benzene	ND	ND	ppbV	NC		25
Bromodichloromethane	ND	ND	ppbV	NC		25
Bromoform	ND	ND	ppbV	NC		25
Carbon tetrachloride	0.060	0.060	ppbV	0		25
Chlorobenzene	ND	ND	ppbV	NC		25
Chloroform	0.040	0.039	ppbV	3		25
cis-1,2-Dichloroethene	ND	ND	ppbV	NC		25
Ethylbenzene	ND	ND	ppbV	NC		25

Lab Duplicate Analysis

Batch Quality Control

Project Name: UNIFIRST WELLS G&H

Lab Number: L1108885

Project Number: MA000989.0002.00C

Report Date: 07/05/11

Parameter	Native Sample	Duplicate Sample	Units	RPD	RPD Limits
Volatile Organics in Air by SIM - Mansfield Lab Associated sample(s): 01-11 QC Batch ID: WG476109-5 QC Sample: L1108884-05 Client ID: DUP Sample					
Methylene chloride	ND	ND	ppbV	NC	25
Methyl tert butyl ether	ND	ND	ppbV	NC	25
Naphthalene	ND	ND	ppbV	NC	25
XYLENE (TOTAL)	ND	ND	ppbV	NC	25
Tetrachloroethene	18.7	17.7	ppbV	5	25
Toluene	ND	ND	ppbV	NC	25
trans-1,2-Dichloroethene	ND	ND	ppbV	NC	25
trans-1,3-Dichloropropene	ND	ND	ppbV	NC	25
Trichloroethene	ND	ND	ppbV	NC	25
Vinyl chloride	ND	ND	ppbV	NC	25
Isopropylbenzene	ND	ND	ppbV	NC	25

Project Name: UNIFIRST WELLS G&H

Project Number: MA000989.0002.00003

Serial_No:07051106:51

Lab Number: L1108885

Report Date: 07/05/11

Canister and Flow Controller Information

Samplenum	Client ID	Media ID	Media Type	Cleaning Batch ID	Initial Pressure (in. Hg)	Pressure on Receipt (in. Hg)	Flow Out mL/min	Flow In mL/min	% RSD
L1108885-01	TB06182011	0373	#16 AMB		-	-	6.4	6.8	6
L1108885-01	TB06182011	1711	6.0L Can	L1108049-15	-29.4	-29.4	-	-	-
L1108885-02	AA-CP-1-06182011	0071	#16 AMB		-	-	6.5	6.9	6
L1108885-02	AA-CP-1-06182011	947	6.0L Can	L1108049-06	-29.4	-4.6	-	-	-
L1108885-03	AA-CP-2-06182011	0326	#16 AMB		-	-	6.7	7.0	4
L1108885-03	AA-CP-2-06182011	1688	6.0L Can	L1108049-05	-29.4	-4.1	-	-	-
L1108885-04	IA-CP-1-06182011	0147	#16 SV		-	-	6.2	6.6	6
L1108885-04	IA-CP-1-06182011	1053	6.0L Can	L1108049-14	-29.4	-5.1	-	-	-
L1108885-05	IA-CP-2-06182011	0500	#16 AMB		-	-	6.6	6.8	3
L1108885-05	IA-CP-2-06182011	987	6.0L Can	L1108049-13	-29.4	-4.4	-	-	-
L1108885-06	DUPIA06182011	0359	#30 AMB		-	-	6.5	7.1	9
L1108885-06	DUPIA06182011	643	6.0L Can	L1108049-10	-29.4	-3.7	-	-	-
L1108885-07	IA-CP-3-06182011	0367	#16 AMB		-	-	6.5	6.6	2
L1108885-07	IA-CP-3-06182011	589	6.0L Can	L1108049-17	-29.4	-4.4	-	-	-
L1108885-08	SS-CP-1-06182011	0300	#16 AMB		-	-	160	165	3
L1108885-08	SS-CP-1-06182011	1695	6.0L Can	L1108435-01	-29.4	-6.9	-	-	-
L1108885-09	SS-CP-2-06182011	0223	#90 SV		-	-	160	162	1



Project Name: UNIFIRST WELLS G&H

Serial_No:07051106:51

Lab Number: L1108885

Project Number: MA000989.0002.00003

Report Date: 07/05/11

Canister and Flow Controller Information

Samplenum	Client ID	Media ID	Media Type	Cleaning Batch ID	Initial Pressure (in. Hg)	Pressure on Receipt (in. Hg)	Flow Out mL/min	Flow In mL/min	% RSD
L1108885-09	SS-CP-2-06182011	742	6.0L Can	L1108049-25	-29.4	-6.4	-	-	-
L1108885-10	SS-CP-3-06182011	0298	#90 SV		-	-	160	165	3
L1108885-10	SS-CP-3-06182011	1666	6.0L Can	L1108049-21	-29.4	-5.3	-	-	-
L1108885-11	DUPSS06182011	0357	#90 SV		-	-	160	150	6
L1108885-11	DUPSS06182011	1587	6.0L Can	L1108049-23	-29.4	-25.6	-	-	-



Air Volatiles Can Certification

Project Name: UNIFIRST WELLS G&H**Lab Number:** L1108049**Project Number:** Not Specified**Report Date:** 07/05/11**Air Canister Certification Results**

Lab ID: L1108049-05
 Client ID: CAN 1688 FC 326
 Sample Location:
 Matrix: Air
 Analytical Method: 48,TO-15-SIM
 Analytical Date: 06/08/11 21:59
 Analyst: RY

Date Collected: 06/08/11 00:00
 Date Received: 06/08/11
 Field Prep: Not Specified

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air by SIM - Mansfield Lab								
1,1,1-Trichloroethane	ND	0.020	0.020	ND	0.109	0.109		1
1,1,2-Trichloroethane	ND	0.020	0.020	ND	0.109	0.109		1
1,1-Dichloroethane	ND	0.020	0.020	ND	0.081	0.081		1
1,1-Dichloroethene	ND	0.020	0.020	ND	0.079	0.079		1
1,2,4-Trimethylbenzene	ND	0.020	0.020	ND	0.098	0.098		1
1,2-Dibromoethane	ND	0.020	0.010	ND	0.154	0.077		1
1,2-Dichloroethane	ND	0.020	0.020	ND	0.081	0.081		1
1,2-Dichloropropane	ND	0.020	0.020	ND	0.092	0.092		1
1,3-Butadiene	ND	0.020	0.020	ND	0.044	0.044		1
1,3-Dichlorobenzene	ND	0.020	0.020	ND	0.120	0.120		1
1,4-Dichlorobenzene	ND	0.020	0.020	ND	0.120	0.120		1
Benzene	ND	0.070	0.070	ND	0.224	0.224		1
Bromodichloromethane	ND	0.020	0.010	ND	0.134	0.067		1
Bromoform	ND	0.020	0.020	ND	0.207	0.207		1
Carbon tetrachloride	ND	0.020	0.020	ND	0.126	0.126		1
Chlorobenzene	ND	0.020	0.020	ND	0.092	0.092		1
Chloroform	ND	0.020	0.020	ND	0.098	0.098		1
cis-1,2-Dichloroethene	ND	0.020	0.020	ND	0.079	0.079		1
Ethylbenzene	ND	0.020	0.020	ND	0.087	0.087		1
Methylene chloride	ND	0.500	0.500	ND	1.74	1.74		1
Methyl tert butyl ether	ND	0.020	0.020	ND	0.072	0.072		1
Naphthalene	ND	0.050	0.025	ND	0.262	0.131		1
p/m-Xylene	ND	0.040	0.040	ND	0.174	0.174		1
o-Xylene	ND	0.020	0.020	ND	0.087	0.087		1
XYLENE (TOTAL)	ND	0.060	0.060	ND	0.261	0.261		1



Project Name: UNIFIRST WELLS G&H**Lab Number:** L1108049**Project Number:** Not Specified**Report Date:** 07/05/11**Air Canister Certification Results**

Lab ID: L1108049-05

Date Collected: 06/08/11 00:00

Client ID: CAN 1688 FC 326

Date Received: 06/08/11

Sample Location:

Field Prep: Not Specified

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air by SIM - Mansfield Lab								
Tetrachloroethene	ND	0.020	0.020	ND	0.136	0.136		1
Toluene	ND	0.050	0.050	ND	0.188	0.188		1
trans-1,2-Dichloroethene	ND	0.020	0.020	ND	0.079	0.079		1
trans-1,3-Dichloropropene	ND	0.020	0.020	ND	0.091	0.091		1
Trichloroethene	ND	0.020	0.020	ND	0.107	0.107		1
Vinyl chloride	ND	0.020	0.020	ND	0.051	0.051		1
Isopropylbenzene	ND	0.500	0.500	ND	2.46	2.46		1

Project Name: UNIFIRST WELLS G&H

Lab Number: L1108049

Project Number: Not Specified

Report Date: 07/05/11

Air Canister Certification Results

Lab ID: L1108049-05

Date Collected: 06/08/11 00:00

Client ID: CAN 1688 FC 326

Date Received: 06/08/11

Sample Location:

Field Prep: Not Specified

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air by SIM - Mansfield Lab								

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-difluorobenzene	87		60-140
bromochloromethane	112		60-140
chlorobenzene-d5	75		60-140



Project Name: UNIFIRST WELLS G&H**Lab Number:** L1108049**Project Number:** Not Specified**Report Date:** 07/05/11**Air Canister Certification Results**

Lab ID: L1108049-06
 Client ID: CAN 947 FC 071
 Sample Location:
 Matrix: Air
 Analytical Method: 48,TO-15-SIM
 Analytical Date: 06/08/11 22:36
 Analyst: RY

Date Collected: 06/08/11 00:00
 Date Received: 06/08/11
 Field Prep: Not Specified

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air by SIM - Mansfield Lab								
1,1,1-Trichloroethane	ND	0.020	0.020	ND	0.109	0.109		1
1,1,2-Trichloroethane	ND	0.020	0.020	ND	0.109	0.109		1
1,1-Dichloroethane	ND	0.020	0.020	ND	0.081	0.081		1
1,1-Dichloroethene	ND	0.020	0.020	ND	0.079	0.079		1
1,2,4-Trimethylbenzene	ND	0.020	0.020	ND	0.098	0.098		1
1,2-Dibromoethane	ND	0.020	0.010	ND	0.154	0.077		1
1,2-Dichloroethane	ND	0.020	0.020	ND	0.081	0.081		1
1,2-Dichloropropane	ND	0.020	0.020	ND	0.092	0.092		1
1,3-Butadiene	ND	0.020	0.020	ND	0.044	0.044		1
1,3-Dichlorobenzene	ND	0.020	0.020	ND	0.120	0.120		1
1,4-Dichlorobenzene	ND	0.020	0.020	ND	0.120	0.120		1
Benzene	ND	0.070	0.070	ND	0.224	0.224		1
Bromodichloromethane	ND	0.020	0.010	ND	0.134	0.067		1
Bromoform	ND	0.020	0.020	ND	0.207	0.207		1
Carbon tetrachloride	ND	0.020	0.020	ND	0.126	0.126		1
Chlorobenzene	ND	0.020	0.020	ND	0.092	0.092		1
Chloroform	ND	0.020	0.020	ND	0.098	0.098		1
cis-1,2-Dichloroethene	ND	0.020	0.020	ND	0.079	0.079		1
Ethylbenzene	ND	0.020	0.020	ND	0.087	0.087		1
Methylene chloride	ND	0.500	0.500	ND	1.74	1.74		1
Methyl tert butyl ether	ND	0.020	0.020	ND	0.072	0.072		1
Naphthalene	ND	0.050	0.025	ND	0.262	0.131		1
p/m-Xylene	ND	0.040	0.040	ND	0.174	0.174		1
o-Xylene	ND	0.020	0.020	ND	0.087	0.087		1
XYLENE (TOTAL)	ND	0.060	0.060	ND	0.261	0.261		1



Project Name: UNIFIRST WELLS G&H**Lab Number:** L1108049**Project Number:** Not Specified**Report Date:** 07/05/11**Air Canister Certification Results**

Lab ID: L1108049-06

Date Collected: 06/08/11 00:00

Client ID: CAN 947 FC 071

Date Received: 06/08/11

Sample Location:

Field Prep: Not Specified

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air by SIM - Mansfield Lab								
Tetrachloroethene	ND	0.020	0.020	ND	0.136	0.136		1
Toluene	ND	0.050	0.050	ND	0.188	0.188		1
trans-1,2-Dichloroethene	ND	0.020	0.020	ND	0.079	0.079		1
trans-1,3-Dichloropropene	ND	0.020	0.020	ND	0.091	0.091		1
Trichloroethene	ND	0.020	0.020	ND	0.107	0.107		1
Vinyl chloride	ND	0.020	0.020	ND	0.051	0.051		1
Isopropylbenzene	ND	0.500	0.500	ND	2.46	2.46		1

Project Name: UNIFIRST WELLS G&H**Lab Number:** L1108049**Project Number:** Not Specified**Report Date:** 07/05/11**Air Canister Certification Results**

Lab ID: L1108049-06

Date Collected: 06/08/11 00:00

Client ID: CAN 947 FC 071

Date Received: 06/08/11

Sample Location:

Field Prep: Not Specified

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air by SIM - Mansfield Lab								

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-difluorobenzene	89		60-140
bromochloromethane	112		60-140
chlorobenzene-d5	76		60-140

Project Name: UNIFIRST WELLS G&H**Lab Number:** L1108049**Project Number:** Not Specified**Report Date:** 07/05/11**Air Canister Certification Results**

Lab ID: L1108049-10
 Client ID: CAN 643 FC 359
 Sample Location:
 Matrix: Air
 Analytical Method: 48,TO-15-SIM
 Analytical Date: 06/09/11 01:01
 Analyst: RY

Date Collected: 06/08/11 00:00
 Date Received: 06/08/11
 Field Prep: Not Specified

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air by SIM - Mansfield Lab								
1,1,1-Trichloroethane	ND	0.020	0.020	ND	0.109	0.109		1
1,1,2-Trichloroethane	ND	0.020	0.020	ND	0.109	0.109		1
1,1-Dichloroethane	ND	0.020	0.020	ND	0.081	0.081		1
1,1-Dichloroethene	ND	0.020	0.020	ND	0.079	0.079		1
1,2,4-Trimethylbenzene	ND	0.020	0.020	ND	0.098	0.098		1
1,2-Dibromoethane	ND	0.020	0.010	ND	0.154	0.077		1
1,2-Dichloroethane	ND	0.020	0.020	ND	0.081	0.081		1
1,2-Dichloropropane	ND	0.020	0.020	ND	0.092	0.092		1
1,3-Butadiene	ND	0.020	0.020	ND	0.044	0.044		1
1,3-Dichlorobenzene	ND	0.020	0.020	ND	0.120	0.120		1
1,4-Dichlorobenzene	ND	0.020	0.020	ND	0.120	0.120		1
Benzene	ND	0.070	0.070	ND	0.224	0.224		1
Bromodichloromethane	ND	0.020	0.010	ND	0.134	0.067		1
Bromoform	ND	0.020	0.020	ND	0.207	0.207		1
Carbon tetrachloride	ND	0.020	0.020	ND	0.126	0.126		1
Chlorobenzene	ND	0.020	0.020	ND	0.092	0.092		1
Chloroform	ND	0.020	0.020	ND	0.098	0.098		1
cis-1,2-Dichloroethene	ND	0.020	0.020	ND	0.079	0.079		1
Ethylbenzene	ND	0.020	0.020	ND	0.087	0.087		1
Methylene chloride	ND	0.500	0.500	ND	1.74	1.74		1
Methyl tert butyl ether	ND	0.020	0.020	ND	0.072	0.072		1
Naphthalene	ND	0.050	0.025	ND	0.262	0.131		1
p/m-Xylene	ND	0.040	0.040	ND	0.174	0.174		1
o-Xylene	ND	0.020	0.020	ND	0.087	0.087		1
XYLENE (TOTAL)	ND	0.060	0.060	ND	0.261	0.261		1



Project Name: UNIFIRST WELLS G&H**Lab Number:** L1108049**Project Number:** Not Specified**Report Date:** 07/05/11**Air Canister Certification Results**

Lab ID: L1108049-10

Date Collected: 06/08/11 00:00

Client ID: CAN 643 FC 359

Date Received: 06/08/11

Sample Location:

Field Prep: Not Specified

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air by SIM - Mansfield Lab								
Tetrachloroethene	ND	0.020	0.020	ND	0.136	0.136		1
Toluene	ND	0.050	0.050	ND	0.188	0.188		1
trans-1,2-Dichloroethene	ND	0.020	0.020	ND	0.079	0.079		1
trans-1,3-Dichloropropene	ND	0.020	0.020	ND	0.091	0.091		1
Trichloroethene	ND	0.020	0.020	ND	0.107	0.107		1
Vinyl chloride	ND	0.020	0.020	ND	0.051	0.051		1
Isopropylbenzene	ND	0.500	0.500	ND	2.46	2.46		1

Project Name: UNIFIRST WELLS G&H**Lab Number:** L1108049**Project Number:** Not Specified**Report Date:** 07/05/11**Air Canister Certification Results**

Lab ID: L1108049-10

Date Collected: 06/08/11 00:00

Client ID: CAN 643 FC 359

Date Received: 06/08/11

Sample Location:

Field Prep: Not Specified

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air by SIM - Mansfield Lab								

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-difluorobenzene	87		60-140
bromochloromethane	113		60-140
chlorobenzene-d5	78		60-140

Project Name: UNIFIRST WELLS G&H**Lab Number:** L1108049**Project Number:** Not Specified**Report Date:** 07/05/11**Air Canister Certification Results**

Lab ID: L1108049-13
 Client ID: CAN 987 FC 500
 Sample Location:
 Matrix: Air
 Analytical Method: 48,TO-15-SIM
 Analytical Date: 06/09/11 20:49
 Analyst: RY

Date Collected: 06/09/11 00:00
 Date Received: 06/09/11
 Field Prep: Not Specified

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air by SIM - Mansfield Lab								
1,1,1-Trichloroethane	ND	0.020	0.020	ND	0.109	0.109		1
1,1,2-Trichloroethane	ND	0.020	0.020	ND	0.109	0.109		1
1,1-Dichloroethane	ND	0.020	0.020	ND	0.081	0.081		1
1,1-Dichloroethene	ND	0.020	0.020	ND	0.079	0.079		1
1,2,4-Trimethylbenzene	ND	0.020	0.020	ND	0.098	0.098		1
1,2-Dibromoethane	ND	0.020	0.010	ND	0.154	0.077		1
1,2-Dichloroethane	ND	0.020	0.020	ND	0.081	0.081		1
1,2-Dichloropropane	ND	0.020	0.020	ND	0.092	0.092		1
1,3-Butadiene	ND	0.020	0.020	ND	0.044	0.044		1
1,3-Dichlorobenzene	ND	0.020	0.020	ND	0.120	0.120		1
1,4-Dichlorobenzene	ND	0.020	0.020	ND	0.120	0.120		1
Benzene	ND	0.070	0.070	ND	0.224	0.224		1
Bromodichloromethane	ND	0.020	0.010	ND	0.134	0.067		1
Bromoform	ND	0.020	0.020	ND	0.207	0.207		1
Carbon tetrachloride	ND	0.020	0.020	ND	0.126	0.126		1
Chlorobenzene	ND	0.020	0.020	ND	0.092	0.092		1
Chloroform	ND	0.020	0.020	ND	0.098	0.098		1
cis-1,2-Dichloroethene	ND	0.020	0.020	ND	0.079	0.079		1
Ethylbenzene	ND	0.020	0.020	ND	0.087	0.087		1
Methylene chloride	ND	0.500	0.500	ND	1.74	1.74		1
Methyl tert butyl ether	ND	0.020	0.020	ND	0.072	0.072		1
Naphthalene	ND	0.050	0.025	ND	0.262	0.131		1
p/m-Xylene	ND	0.040	0.040	ND	0.174	0.174		1
o-Xylene	ND	0.020	0.020	ND	0.087	0.087		1
XYLENE (TOTAL)	ND	0.060	0.060	ND	0.261	0.261		1



Project Name: UNIFIRST WELLS G&H**Lab Number:** L1108049**Project Number:** Not Specified**Report Date:** 07/05/11**Air Canister Certification Results**

Lab ID: L1108049-13

Date Collected: 06/09/11 00:00

Client ID: CAN 987 FC 500

Date Received: 06/09/11

Sample Location:

Field Prep: Not Specified

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air by SIM - Mansfield Lab								
Tetrachloroethene	ND	0.020	0.020	ND	0.136	0.136		1
Toluene	ND	0.050	0.050	ND	0.188	0.188		1
trans-1,2-Dichloroethene	ND	0.020	0.020	ND	0.079	0.079		1
trans-1,3-Dichloropropene	ND	0.020	0.020	ND	0.091	0.091		1
Trichloroethene	ND	0.020	0.020	ND	0.107	0.107		1
Vinyl chloride	ND	0.020	0.020	ND	0.051	0.051		1
Isopropylbenzene	ND	0.500	0.500	ND	2.46	2.46		1

Project Name: UNIFIRST WELLS G&H

Lab Number: L1108049

Project Number: Not Specified

Report Date: 07/05/11

Air Canister Certification Results

Lab ID: L1108049-13

Date Collected: 06/09/11 00:00

Client ID: CAN 987 FC 500

Date Received: 06/09/11

Sample Location:

Field Prep: Not Specified

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air by SIM - Mansfield Lab								

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-difluorobenzene	83		60-140
bromochloromethane	119		60-140
chlorobenzene-d5	73		60-140



Project Name: UNIFIRST WELLS G&H**Lab Number:** L1108049**Project Number:** Not Specified**Report Date:** 07/05/11**Air Canister Certification Results**

Lab ID: L1108049-14
 Client ID: CAN 1053 FC 147
 Sample Location:
 Matrix: Air
 Analytical Method: 48,TO-15-SIM
 Analytical Date: 06/09/11 21:25
 Analyst: RY

Date Collected: 06/09/11 00:00
 Date Received: 06/09/11
 Field Prep: Not Specified

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air by SIM - Mansfield Lab								
1,1,1-Trichloroethane	ND	0.020	0.020	ND	0.109	0.109		1
1,1,2-Trichloroethane	ND	0.020	0.020	ND	0.109	0.109		1
1,1-Dichloroethane	ND	0.020	0.020	ND	0.081	0.081		1
1,1-Dichloroethene	ND	0.020	0.020	ND	0.079	0.079		1
1,2,4-Trimethylbenzene	ND	0.020	0.020	ND	0.098	0.098		1
1,2-Dibromoethane	ND	0.020	0.010	ND	0.154	0.077		1
1,2-Dichloroethane	ND	0.020	0.020	ND	0.081	0.081		1
1,2-Dichloropropane	ND	0.020	0.020	ND	0.092	0.092		1
1,3-Butadiene	ND	0.020	0.020	ND	0.044	0.044		1
1,3-Dichlorobenzene	ND	0.020	0.020	ND	0.120	0.120		1
1,4-Dichlorobenzene	ND	0.020	0.020	ND	0.120	0.120		1
Benzene	ND	0.070	0.070	ND	0.224	0.224		1
Bromodichloromethane	ND	0.020	0.010	ND	0.134	0.067		1
Bromoform	ND	0.020	0.020	ND	0.207	0.207		1
Carbon tetrachloride	ND	0.020	0.020	ND	0.126	0.126		1
Chlorobenzene	ND	0.020	0.020	ND	0.092	0.092		1
Chloroform	ND	0.020	0.020	ND	0.098	0.098		1
cis-1,2-Dichloroethene	ND	0.020	0.020	ND	0.079	0.079		1
Ethylbenzene	ND	0.020	0.020	ND	0.087	0.087		1
Methylene chloride	ND	0.500	0.500	ND	1.74	1.74		1
Methyl tert butyl ether	ND	0.020	0.020	ND	0.072	0.072		1
Naphthalene	ND	0.050	0.025	ND	0.262	0.131		1
p/m-Xylene	ND	0.040	0.040	ND	0.174	0.174		1
o-Xylene	ND	0.020	0.020	ND	0.087	0.087		1
XYLENE (TOTAL)	ND	0.060	0.060	ND	0.261	0.261		1



Project Name: UNIFIRST WELLS G&H**Lab Number:** L1108049**Project Number:** Not Specified**Report Date:** 07/05/11**Air Canister Certification Results**

Lab ID: L1108049-14

Date Collected: 06/09/11 00:00

Client ID: CAN 1053 FC 147

Date Received: 06/09/11

Sample Location:

Field Prep: Not Specified

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air by SIM - Mansfield Lab								
Tetrachloroethene	ND	0.020	0.020	ND	0.136	0.136		1
Toluene	ND	0.050	0.050	ND	0.188	0.188		1
trans-1,2-Dichloroethene	ND	0.020	0.020	ND	0.079	0.079		1
trans-1,3-Dichloropropene	ND	0.020	0.020	ND	0.091	0.091		1
Trichloroethene	ND	0.020	0.020	ND	0.107	0.107		1
Vinyl chloride	ND	0.020	0.020	ND	0.051	0.051		1
Isopropylbenzene	ND	0.500	0.500	ND	2.46	2.46		1

Project Name: UNIFIRST WELLS G&H**Lab Number:** L1108049**Project Number:** Not Specified**Report Date:** 07/05/11**Air Canister Certification Results**

Lab ID: L1108049-14

Date Collected: 06/09/11 00:00

Client ID: CAN 1053 FC 147

Date Received: 06/09/11

Sample Location:

Field Prep: Not Specified

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air by SIM - Mansfield Lab								

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-difluorobenzene	92		60-140
bromochloromethane	127		60-140
chlorobenzene-d5	79		60-140

Project Name: UNIFIRST WELLS G&H**Lab Number:** L1108049**Project Number:** Not Specified**Report Date:** 07/05/11**Air Canister Certification Results**

Lab ID: L1108049-15
 Client ID: CAN 1711 FC 373
 Sample Location:
 Matrix: Air
 Analytical Method: 48,TO-15-SIM
 Analytical Date: 06/09/11 22:01
 Analyst: RY

Date Collected: 06/09/11 00:00
 Date Received: 06/09/11
 Field Prep: Not Specified

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air by SIM - Mansfield Lab								
1,1,1-Trichloroethane	ND	0.020	0.020	ND	0.109	0.109		1
1,1,2-Trichloroethane	ND	0.020	0.020	ND	0.109	0.109		1
1,1-Dichloroethane	ND	0.020	0.020	ND	0.081	0.081		1
1,1-Dichloroethene	ND	0.020	0.020	ND	0.079	0.079		1
1,2,4-Trimethylbenzene	ND	0.020	0.020	ND	0.098	0.098		1
1,2-Dibromoethane	ND	0.020	0.010	ND	0.154	0.077		1
1,2-Dichloroethane	ND	0.020	0.020	ND	0.081	0.081		1
1,2-Dichloropropane	ND	0.020	0.020	ND	0.092	0.092		1
1,3-Butadiene	ND	0.020	0.020	ND	0.044	0.044		1
1,3-Dichlorobenzene	ND	0.020	0.020	ND	0.120	0.120		1
1,4-Dichlorobenzene	ND	0.020	0.020	ND	0.120	0.120		1
Benzene	ND	0.070	0.070	ND	0.224	0.224		1
Bromodichloromethane	ND	0.020	0.010	ND	0.134	0.067		1
Bromoform	ND	0.020	0.020	ND	0.207	0.207		1
Carbon tetrachloride	ND	0.020	0.020	ND	0.126	0.126		1
Chlorobenzene	ND	0.020	0.020	ND	0.092	0.092		1
Chloroform	ND	0.020	0.020	ND	0.098	0.098		1
cis-1,2-Dichloroethene	ND	0.020	0.020	ND	0.079	0.079		1
Ethylbenzene	ND	0.020	0.020	ND	0.087	0.087		1
Methylene chloride	ND	0.500	0.500	ND	1.74	1.74		1
Methyl tert butyl ether	ND	0.020	0.020	ND	0.072	0.072		1
Naphthalene	ND	0.050	0.025	ND	0.262	0.131		1
p/m-Xylene	ND	0.040	0.040	ND	0.174	0.174		1
o-Xylene	ND	0.020	0.020	ND	0.087	0.087		1
XYLENE (TOTAL)	ND	0.060	0.060	ND	0.261	0.261		1



Project Name: UNIFIRST WELLS G&H**Lab Number:** L1108049**Project Number:** Not Specified**Report Date:** 07/05/11**Air Canister Certification Results**

Lab ID: L1108049-15

Date Collected: 06/09/11 00:00

Client ID: CAN 1711 FC 373

Date Received: 06/09/11

Sample Location:

Field Prep: Not Specified

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air by SIM - Mansfield Lab								
Tetrachloroethene	ND	0.020	0.020	ND	0.136	0.136		1
Toluene	ND	0.050	0.050	ND	0.188	0.188		1
trans-1,2-Dichloroethene	ND	0.020	0.020	ND	0.079	0.079		1
trans-1,3-Dichloropropene	ND	0.020	0.020	ND	0.091	0.091		1
Trichloroethene	ND	0.020	0.020	ND	0.107	0.107		1
Vinyl chloride	ND	0.020	0.020	ND	0.051	0.051		1
Isopropylbenzene	ND	0.500	0.500	ND	2.46	2.46		1



Project Name: UNIFIRST WELLS G&H**Lab Number:** L1108049**Project Number:** Not Specified**Report Date:** 07/05/11**Air Canister Certification Results**

Lab ID: L1108049-15

Date Collected: 06/09/11 00:00

Client ID: CAN 1711 FC 373

Date Received: 06/09/11

Sample Location:

Field Prep: Not Specified

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air by SIM - Mansfield Lab								

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-difluorobenzene	95		60-140
bromochloromethane	129		60-140
chlorobenzene-d5	81		60-140

Project Name: UNIFIRST WELLS G&H**Lab Number:** L1108049**Project Number:** Not Specified**Report Date:** 07/05/11**Air Canister Certification Results**

Lab ID: L1108049-17

Date Collected: 06/09/11 00:00

Client ID: CAN 589 FC 367

Date Received: 06/09/11

Sample Location:

Field Prep: Not Specified

Matrix: Air

Analytical Method: 48,TO-15-SIM

Analytical Date: 06/09/11 23:12

Analyst: RY

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air by SIM - Mansfield Lab								
1,1,1-Trichloroethane	ND	0.020	0.020	ND	0.109	0.109		1
1,1,2-Trichloroethane	ND	0.020	0.020	ND	0.109	0.109		1
1,1-Dichloroethane	ND	0.020	0.020	ND	0.081	0.081		1
1,1-Dichloroethene	ND	0.020	0.020	ND	0.079	0.079		1
1,2,4-Trimethylbenzene	ND	0.020	0.020	ND	0.098	0.098		1
1,2-Dibromoethane	ND	0.020	0.010	ND	0.154	0.077		1
1,2-Dichloroethane	ND	0.020	0.020	ND	0.081	0.081		1
1,2-Dichloropropane	ND	0.020	0.020	ND	0.092	0.092		1
1,3-Butadiene	ND	0.020	0.020	ND	0.044	0.044		1
1,3-Dichlorobenzene	ND	0.020	0.020	ND	0.120	0.120		1
1,4-Dichlorobenzene	ND	0.020	0.020	ND	0.120	0.120		1
Benzene	ND	0.070	0.070	ND	0.224	0.224		1
Bromodichloromethane	ND	0.020	0.010	ND	0.134	0.067		1
Bromoform	ND	0.020	0.020	ND	0.207	0.207		1
Carbon tetrachloride	ND	0.020	0.020	ND	0.126	0.126		1
Chlorobenzene	ND	0.020	0.020	ND	0.092	0.092		1
Chloroform	ND	0.020	0.020	ND	0.098	0.098		1
cis-1,2-Dichloroethene	ND	0.020	0.020	ND	0.079	0.079		1
Ethylbenzene	ND	0.020	0.020	ND	0.087	0.087		1
Methylene chloride	ND	0.500	0.500	ND	1.74	1.74		1
Methyl tert butyl ether	ND	0.020	0.020	ND	0.072	0.072		1
Naphthalene	ND	0.050	0.025	ND	0.262	0.131		1
p/m-Xylene	ND	0.040	0.040	ND	0.174	0.174		1
o-Xylene	ND	0.020	0.020	ND	0.087	0.087		1
XYLENE (TOTAL)	ND	0.060	0.060	ND	0.261	0.261		1



Project Name: UNIFIRST WELLS G&H**Lab Number:** L1108049**Project Number:** Not Specified**Report Date:** 07/05/11**Air Canister Certification Results**

Lab ID: L1108049-17

Date Collected: 06/09/11 00:00

Client ID: CAN 589 FC 367

Date Received: 06/09/11

Sample Location:

Field Prep: Not Specified

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air by SIM - Mansfield Lab								
Tetrachloroethene	ND	0.020	0.020	ND	0.136	0.136		1
Toluene	ND	0.050	0.050	ND	0.188	0.188		1
trans-1,2-Dichloroethene	ND	0.020	0.020	ND	0.079	0.079		1
trans-1,3-Dichloropropene	ND	0.020	0.020	ND	0.091	0.091		1
Trichloroethene	ND	0.020	0.020	ND	0.107	0.107		1
Vinyl chloride	ND	0.020	0.020	ND	0.051	0.051		1
Isopropylbenzene	ND	0.500	0.500	ND	2.46	2.46		1

Project Name: UNIFIRST WELLS G&H**Lab Number:** L1108049**Project Number:** Not Specified**Report Date:** 07/05/11**Air Canister Certification Results**

Lab ID: L1108049-17

Date Collected: 06/09/11 00:00

Client ID: CAN 589 FC 367

Date Received: 06/09/11

Sample Location:

Field Prep: Not Specified

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air by SIM - Mansfield Lab								

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-difluorobenzene	94		60-140
bromochloromethane	128		60-140
chlorobenzene-d5	79		60-140

Project Name: UNIFIRST WELLS G&H**Lab Number:** L1108049**Project Number:** Not Specified**Report Date:** 07/05/11**Air Canister Certification Results**

Lab ID: L1108049-21
 Client ID: CAN 1666 FC 298
 Sample Location:
 Matrix: Air
 Analytical Method: 48,TO-15-SIM
 Analytical Date: 06/10/11 01:35
 Analyst: RY

Date Collected: 06/09/11 00:00
 Date Received: 06/09/11
 Field Prep: Not Specified

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air by SIM - Mansfield Lab								
1,1,1-Trichloroethane	ND	0.020	0.020	ND	0.109	0.109		1
1,1,2-Trichloroethane	ND	0.020	0.020	ND	0.109	0.109		1
1,1-Dichloroethane	ND	0.020	0.020	ND	0.081	0.081		1
1,1-Dichloroethene	ND	0.020	0.020	ND	0.079	0.079		1
1,2,4-Trimethylbenzene	ND	0.020	0.020	ND	0.098	0.098		1
1,2-Dibromoethane	ND	0.020	0.010	ND	0.154	0.077		1
1,2-Dichloroethane	ND	0.020	0.020	ND	0.081	0.081		1
1,2-Dichloropropane	ND	0.020	0.020	ND	0.092	0.092		1
1,3-Butadiene	ND	0.020	0.020	ND	0.044	0.044		1
1,3-Dichlorobenzene	ND	0.020	0.020	ND	0.120	0.120		1
1,4-Dichlorobenzene	ND	0.020	0.020	ND	0.120	0.120		1
Benzene	ND	0.070	0.070	ND	0.224	0.224		1
Bromodichloromethane	ND	0.020	0.010	ND	0.134	0.067		1
Bromoform	ND	0.020	0.020	ND	0.207	0.207		1
Carbon tetrachloride	ND	0.020	0.020	ND	0.126	0.126		1
Chlorobenzene	ND	0.020	0.020	ND	0.092	0.092		1
Chloroform	ND	0.020	0.020	ND	0.098	0.098		1
cis-1,2-Dichloroethene	ND	0.020	0.020	ND	0.079	0.079		1
Ethylbenzene	ND	0.020	0.020	ND	0.087	0.087		1
Methylene chloride	ND	0.500	0.500	ND	1.74	1.74		1
Methyl tert butyl ether	ND	0.020	0.020	ND	0.072	0.072		1
Naphthalene	ND	0.050	0.025	ND	0.262	0.131		1
p/m-Xylene	ND	0.040	0.040	ND	0.174	0.174		1
o-Xylene	ND	0.020	0.020	ND	0.087	0.087		1
XYLENE (TOTAL)	ND	0.060	0.060	ND	0.261	0.261		1



Project Name: UNIFIRST WELLS G&H**Lab Number:** L1108049**Project Number:** Not Specified**Report Date:** 07/05/11**Air Canister Certification Results**

Lab ID: L1108049-21

Date Collected: 06/09/11 00:00

Client ID: CAN 1666 FC 298

Date Received: 06/09/11

Sample Location:

Field Prep: Not Specified

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air by SIM - Mansfield Lab								
Tetrachloroethene	ND	0.020	0.020	ND	0.136	0.136		1
Toluene	ND	0.050	0.050	ND	0.188	0.188		1
trans-1,2-Dichloroethene	ND	0.020	0.020	ND	0.079	0.079		1
trans-1,3-Dichloropropene	ND	0.020	0.020	ND	0.091	0.091		1
Trichloroethene	ND	0.020	0.020	ND	0.107	0.107		1
Vinyl chloride	ND	0.020	0.020	ND	0.051	0.051		1
Isopropylbenzene	ND	0.500	0.500	ND	2.46	2.46		1

Project Name: UNIFIRST WELLS G&H**Lab Number:** L1108049**Project Number:** Not Specified**Report Date:** 07/05/11**Air Canister Certification Results**

Lab ID: L1108049-21

Date Collected: 06/09/11 00:00

Client ID: CAN 1666 FC 298

Date Received: 06/09/11

Sample Location:

Field Prep: Not Specified

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air by SIM - Mansfield Lab								

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-difluorobenzene	91		60-140
bromochloromethane	121		60-140
chlorobenzene-d5	76		60-140

Project Name: UNIFIRST WELLS G&H**Lab Number:** L1108049**Project Number:** Not Specified**Report Date:** 07/05/11**Air Canister Certification Results**

Lab ID: L1108049-23
 Client ID: CAN 1587 FC 357
 Sample Location:
 Matrix: Air
 Analytical Method: 48,TO-15-SIM
 Analytical Date: 06/10/11 02:47
 Analyst: RY

Date Collected: 06/09/11 00:00
 Date Received: 06/09/11
 Field Prep: Not Specified

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air by SIM - Mansfield Lab								
1,1,1-Trichloroethane	ND	0.020	0.020	ND	0.109	0.109		1
1,1,2-Trichloroethane	ND	0.020	0.020	ND	0.109	0.109		1
1,1-Dichloroethane	ND	0.020	0.020	ND	0.081	0.081		1
1,1-Dichloroethene	ND	0.020	0.020	ND	0.079	0.079		1
1,2,4-Trimethylbenzene	ND	0.020	0.020	ND	0.098	0.098		1
1,2-Dibromoethane	ND	0.020	0.010	ND	0.154	0.077		1
1,2-Dichloroethane	ND	0.020	0.020	ND	0.081	0.081		1
1,2-Dichloropropane	ND	0.020	0.020	ND	0.092	0.092		1
1,3-Butadiene	ND	0.020	0.020	ND	0.044	0.044		1
1,3-Dichlorobenzene	ND	0.020	0.020	ND	0.120	0.120		1
1,4-Dichlorobenzene	ND	0.020	0.020	ND	0.120	0.120		1
Benzene	ND	0.070	0.070	ND	0.224	0.224		1
Bromodichloromethane	ND	0.020	0.010	ND	0.134	0.067		1
Bromoform	ND	0.020	0.020	ND	0.207	0.207		1
Carbon tetrachloride	ND	0.020	0.020	ND	0.126	0.126		1
Chlorobenzene	ND	0.020	0.020	ND	0.092	0.092		1
Chloroform	ND	0.020	0.020	ND	0.098	0.098		1
cis-1,2-Dichloroethene	ND	0.020	0.020	ND	0.079	0.079		1
Ethylbenzene	ND	0.020	0.020	ND	0.087	0.087		1
Methylene chloride	ND	0.500	0.500	ND	1.74	1.74		1
Methyl tert butyl ether	ND	0.020	0.020	ND	0.072	0.072		1
Naphthalene	ND	0.050	0.025	ND	0.262	0.131		1
p/m-Xylene	ND	0.040	0.040	ND	0.174	0.174		1
o-Xylene	ND	0.020	0.020	ND	0.087	0.087		1
XYLENE (TOTAL)	ND	0.060	0.060	ND	0.261	0.261		1



Project Name: UNIFIRST WELLS G&H**Lab Number:** L1108049**Project Number:** Not Specified**Report Date:** 07/05/11**Air Canister Certification Results**

Lab ID: L1108049-23

Date Collected: 06/09/11 00:00

Client ID: CAN 1587 FC 357

Date Received: 06/09/11

Sample Location:

Field Prep: Not Specified

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air by SIM - Mansfield Lab								
Tetrachloroethene	ND	0.020	0.020	ND	0.136	0.136		1
Toluene	ND	0.050	0.050	ND	0.188	0.188		1
trans-1,2-Dichloroethene	ND	0.020	0.020	ND	0.079	0.079		1
trans-1,3-Dichloropropene	ND	0.020	0.020	ND	0.091	0.091		1
Trichloroethene	ND	0.020	0.020	ND	0.107	0.107		1
Vinyl chloride	ND	0.020	0.020	ND	0.051	0.051		1
Isopropylbenzene	ND	0.500	0.500	ND	2.46	2.46		1

Project Name: UNIFIRST WELLS G&H**Lab Number:** L1108049**Project Number:** Not Specified**Report Date:** 07/05/11**Air Canister Certification Results**

Lab ID: L1108049-23

Date Collected: 06/09/11 00:00

Client ID: CAN 1587 FC 357

Date Received: 06/09/11

Sample Location:

Field Prep: Not Specified

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air by SIM - Mansfield Lab								

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-difluorobenzene	91		60-140
bromochloromethane	123		60-140
chlorobenzene-d5	76		60-140

Project Name: UNIFIRST WELLS G&H**Lab Number:** L1108049**Project Number:** Not Specified**Report Date:** 07/05/11**Air Canister Certification Results**

Lab ID: L1108049-25
 Client ID: CAN 742 FC 223
 Sample Location:
 Matrix: Air
 Analytical Method: 48,TO-15-SIM
 Analytical Date: 06/11/11 12:04
 Analyst: RY

Date Collected: 06/09/11 00:00
 Date Received: 06/09/11
 Field Prep: Not Specified

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air by SIM - Mansfield Lab								
1,1,1-Trichloroethane	ND	0.020	0.020	ND	0.109	0.109		1
1,1,2-Trichloroethane	ND	0.020	0.020	ND	0.109	0.109		1
1,1-Dichloroethane	ND	0.020	0.020	ND	0.081	0.081		1
1,1-Dichloroethene	ND	0.020	0.020	ND	0.079	0.079		1
1,2,4-Trimethylbenzene	ND	0.020	0.020	ND	0.098	0.098		1
1,2-Dibromoethane	ND	0.020	0.010	ND	0.154	0.077		1
1,2-Dichloroethane	ND	0.020	0.020	ND	0.081	0.081		1
1,2-Dichloropropane	ND	0.020	0.020	ND	0.092	0.092		1
1,3-Butadiene	ND	0.020	0.020	ND	0.044	0.044		1
1,3-Dichlorobenzene	ND	0.020	0.020	ND	0.120	0.120		1
1,4-Dichlorobenzene	ND	0.020	0.020	ND	0.120	0.120		1
Benzene	ND	0.070	0.070	ND	0.224	0.224		1
Bromodichloromethane	ND	0.020	0.010	ND	0.134	0.067		1
Bromoform	ND	0.020	0.020	ND	0.207	0.207		1
Carbon tetrachloride	ND	0.020	0.020	ND	0.126	0.126		1
Chlorobenzene	ND	0.020	0.020	ND	0.092	0.092		1
Chloroform	ND	0.020	0.020	ND	0.098	0.098		1
cis-1,2-Dichloroethene	ND	0.020	0.020	ND	0.079	0.079		1
Ethylbenzene	ND	0.020	0.020	ND	0.087	0.087		1
Methylene chloride	ND	0.500	0.500	ND	1.74	1.74		1
Methyl tert butyl ether	ND	0.020	0.020	ND	0.072	0.072		1
Naphthalene	ND	0.050	0.025	ND	0.262	0.131		1
p/m-Xylene	ND	0.040	0.040	ND	0.174	0.174		1
o-Xylene	ND	0.020	0.020	ND	0.087	0.087		1
XYLENE (TOTAL)	ND	0.060	0.060	ND	0.261	0.261		1



Project Name: UNIFIRST WELLS G&H**Lab Number:** L1108049**Project Number:** Not Specified**Report Date:** 07/05/11**Air Canister Certification Results**

Lab ID: L1108049-25

Date Collected: 06/09/11 00:00

Client ID: CAN 742 FC 223

Date Received: 06/09/11

Sample Location:

Field Prep: Not Specified

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air by SIM - Mansfield Lab								
Tetrachloroethene	ND	0.020	0.020	ND	0.136	0.136		1
Toluene	ND	0.050	0.050	ND	0.188	0.188		1
trans-1,2-Dichloroethene	ND	0.020	0.020	ND	0.079	0.079		1
trans-1,3-Dichloropropene	ND	0.020	0.020	ND	0.091	0.091		1
Trichloroethene	ND	0.020	0.020	ND	0.107	0.107		1
Vinyl chloride	ND	0.020	0.020	ND	0.051	0.051		1
Isopropylbenzene	ND	0.500	0.500	ND	2.46	2.46		1

Project Name: UNIFIRST WELLS G&H**Lab Number:** L1108049**Project Number:** Not Specified**Report Date:** 07/05/11**Air Canister Certification Results**

Lab ID: L1108049-25

Date Collected: 06/09/11 00:00

Client ID: CAN 742 FC 223

Date Received: 06/09/11

Sample Location:

Field Prep: Not Specified

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air by SIM - Mansfield Lab								

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-difluorobenzene	97		60-140
bromochloromethane	126		60-140
chlorobenzene-d5	78		60-140

Project Name: UNIFIRST WELLS G&H**Lab Number:** L1108435**Project Number:** Not Specified**Report Date:** 07/05/11**Air Canister Certification Results**

Lab ID: L1108435-01
 Client ID: CAN 1695 FC 300
 Sample Location:
 Matrix: Air
 Analytical Method: 48,TO-15-SIM
 Analytical Date: 06/14/11 23:06
 Analyst: AJ

Date Collected: 06/09/11 00:00
 Date Received: 06/09/11
 Field Prep: Not Specified

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air by SIM - Mansfield Lab								
1,1,1-Trichloroethane	ND	0.020	0.020	ND	0.109	0.109		1
1,1,2-Trichloroethane	ND	0.020	0.020	ND	0.109	0.109		1
1,1-Dichloroethane	ND	0.020	0.020	ND	0.081	0.081		1
1,1-Dichloroethene	ND	0.020	0.020	ND	0.079	0.079		1
1,2,4-Trimethylbenzene	ND	0.020	0.020	ND	0.098	0.098		1
1,2-Dibromoethane	ND	0.020	0.010	ND	0.154	0.077		1
1,2-Dichloroethane	ND	0.020	0.020	ND	0.081	0.081		1
1,2-Dichloropropane	ND	0.020	0.020	ND	0.092	0.092		1
1,3-Butadiene	ND	0.020	0.020	ND	0.044	0.044		1
1,3-Dichlorobenzene	ND	0.020	0.020	ND	0.120	0.120		1
1,4-Dichlorobenzene	ND	0.020	0.020	ND	0.120	0.120		1
Benzene	ND	0.070	0.070	ND	0.224	0.224		1
Bromodichloromethane	ND	0.020	0.010	ND	0.134	0.067		1
Bromoform	ND	0.020	0.020	ND	0.207	0.207		1
Carbon tetrachloride	ND	0.020	0.020	ND	0.126	0.126		1
Chlorobenzene	ND	0.020	0.020	ND	0.092	0.092		1
Chloroform	ND	0.020	0.020	ND	0.098	0.098		1
cis-1,2-Dichloroethene	ND	0.020	0.020	ND	0.079	0.079		1
Ethylbenzene	ND	0.020	0.020	ND	0.087	0.087		1
Methylene chloride	ND	0.500	0.500	ND	1.74	1.74		1
Methyl tert butyl ether	ND	0.020	0.020	ND	0.072	0.072		1
Naphthalene	ND	0.050	0.025	ND	0.262	0.131		1
p/m-Xylene	ND	0.040	0.040	ND	0.174	0.174		1
o-Xylene	ND	0.020	0.020	ND	0.087	0.087		1
XYLENE (TOTAL)	ND	0.060	0.060	ND	0.261	0.261		1



Project Name: UNIFIRST WELLS G&H**Lab Number:** L1108435**Project Number:** Not Specified**Report Date:** 07/05/11**Air Canister Certification Results**

Lab ID: L1108435-01

Date Collected: 06/09/11 00:00

Client ID: CAN 1695 FC 300

Date Received: 06/09/11

Sample Location:

Field Prep: Not Specified

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air by SIM - Mansfield Lab								
Tetrachloroethene	ND	0.020	0.020	ND	0.136	0.136		1
Toluene	ND	0.050	0.050	ND	0.188	0.188		1
trans-1,2-Dichloroethene	ND	0.020	0.020	ND	0.079	0.079		1
trans-1,3-Dichloropropene	ND	0.020	0.020	ND	0.091	0.091		1
Trichloroethene	ND	0.020	0.020	ND	0.107	0.107		1
Vinyl chloride	ND	0.020	0.020	ND	0.051	0.051		1
Isopropylbenzene	ND	0.500	0.500	ND	2.46	2.46		1

Project Name: UNIFIRST WELLS G&H**Lab Number:** L1108435**Project Number:** Not Specified**Report Date:** 07/05/11**Air Canister Certification Results**

Lab ID: L1108435-01

Date Collected: 06/09/11 00:00

Client ID: CAN 1695 FC 300

Date Received: 06/09/11

Sample Location:

Field Prep: Not Specified

Parameter	ppbV			ug/m3			Qualifier	Dilution Factor
	Results	RL	MDL	Results	RL	MDL		
Volatile Organics in Air by SIM - Mansfield Lab								

Internal Standard	% Recovery	Qualifier	Acceptance Criteria
1,4-difluorobenzene	121		60-140
bromochloromethane	110		60-140
chlorobenzene-d5	100		60-140

Project Name: UNIFIRST WELLS G&H

Lab Number: L1108885

Project Number: MA000989.0002.00003

Report Date: 07/05/11

Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Reagent H2O Preserved Vials Frozen on: NA

Cooler Information Custody Seal**Cooler**

N/A Present/Intact

Container Information

Container ID	Container Type	Cooler	pH	Temp deg C	Pres	Seal	Analysis(*)
L1108885-01A	Canister - 6 Liter	N/A	NA		Y	Present/Intact	TO15-SIM-UNI(30)
L1108885-02A	Canister - 6 Liter	N/A	NA		Y	Present/Intact	TO15-SIM-UNI(30)
L1108885-03A	Canister - 6 Liter	N/A	NA		Y	Present/Intact	TO15-SIM-UNI(30)
L1108885-04A	Canister - 6 Liter	N/A	NA		Y	Present/Intact	TO15-SIM-UNI(30)
L1108885-05A	Canister - 6 Liter	N/A	NA		Y	Present/Intact	TO15-SIM-UNI(30)
L1108885-06A	Canister - 6 Liter	N/A	NA		Y	Present/Intact	TO15-SIM-UNI(30)
L1108885-07A	Canister - 6 Liter	N/A	NA		Y	Present/Intact	TO15-SIM-UNI(30)
L1108885-08A	Canister - 6 Liter	N/A	NA		Y	Present/Intact	TO15-SIM-UNI(30)
L1108885-09A	Canister - 6 Liter	N/A	NA		Y	Present/Intact	TO15-SIM-UNI(30)
L1108885-10A	Canister - 6 Liter	N/A	NA		Y	Present/Intact	TO15-SIM-UNI(30)
L1108885-11A	Canister - 6 Liter	N/A	NA		Y	Present/Intact	TO15-SIM-UNI(30)

*Values in parentheses indicate holding time in days

Project Name: UNIFIRST WELLS G&H
Project Number: MA000989.0002.00003

Lab Number: L1108885
Report Date: 07/05/11

GLOSSARY

Acronyms

EPA	- Environmental Protection Agency.
LCS	- Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LCSD	- Laboratory Control Sample Duplicate: Refer to LCS.
LFB	- Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
MDL	- Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
MS	- Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available.
MSD	- Matrix Spike Sample Duplicate: Refer to MS.
NA	- Not Applicable.
NC	- Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.
NI	- Not Ignitable.
RL	- Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
RPD	- Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.
SRM	- Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.

Footnotes

- 1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

Terms

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

Data Qualifiers

- A** - Spectra identified as "Aldol Condensation Product".
- B** - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than five times (5x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank.
- C** - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.
- D** - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.
- E** - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.
- G** - The concentration may be biased high due to matrix interferences (i.e. co-elution) with non-target compound(s). The result should be considered estimated.
- H** - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.
- I** - The RPD between the results for the two columns exceeds the method-specified criteria; however, the lower value has been reported due to obvious interference.
- M** - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.
- P** - The RPD between the results for the two columns exceeds the method-specified criteria.
- Q** - The quality control sample exceeds the associated acceptance criteria. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less

Report Format: DU Report with "J" Qualifiers



Project Name: UNIFIRST WELLS G&H
Project Number: MA000989.0002.00003

Lab Number: L1108885
Report Date: 07/05/11

Data Qualifiers

than 5x the RL. (Metals only.)

R - Analytical results are from sample re-analysis.

RE - Analytical results are from sample re-extraction.

J - Estimated value. The Target analyte concentration is below the quantitation limit (RL), but above the Method Detection Limit (MDL). This represents an estimated concentration for Tentatively Identified Compounds (TICs).

ND - Not detected at the method detection limit (MDL) for the sample.

Report Format: DU Report with "J" Qualifiers



Project Name: UNIFIRST WELLS G&H
Project Number: MA000989.0002.00003

Lab Number: L1108885
Report Date: 07/05/11

REFERENCES

- 48 Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air. Second Edition. EPA/625/R-96/010b, January 1999.

LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.



Certificate Approval Program Summary

Last revised March 23, 2011 □ Mansfield Facility

The following list includes only those analytes/methods for which certification/approval is currently held. For a complete listing of analytes for the referenced methods, please contact your Alpha Customer Service Representative.

Connecticut Department of Public Health Certificate/Lab ID: PH-0141.

Wastewater/Non-Potable Water (Inorganic Parameters: pH, Turbidity, Conductivity, Alkalinity, Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Mercury, Molybdenum, Nickel, Potassium, Selenium, Silver, Sodium, Strontium, Thallium, Tin, Vanadium, Zinc, Total Residue (Solids), Total Suspended Solids (non-filterable), Total Cyanide. Organic Parameters: PCBs, Organochlorine Pesticides, Technical Chlordane, Toxaphene, Acid Extractables, Benzidines, Phthalate Esters, Nitrosamines, Nitroaromatics □ Isophorone, PAHs, Haloethers, Chlorinated Hydrocarbons, Volatile Organics.)

Solid Waste/Soil (Inorganic Parameters: pH, Aluminum, Antimony, Arsenic, Barium, Beryllium, Cadmium, Calcium, Chromium, Hexavalent Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Mercury, Molybdenum, Nickel, Potassium, Selenium, Silver, Sodium, Thallium, Vanadium, Zinc, Total Organic Carbon, Total Cyanide, Corrosivity, TCLP 1311. Organic Parameters: PCBs, Organochlorine Pesticides, Technical Chlordane, Toxaphene, Volatile Organics, Acid Extractables, Benzidines, Phthalates, Nitrosamines, Nitroaromatics □ Cyclic Ketones, PAHs, Haloethers, Chlorinated Hydrocarbons.)

Florida Department of Health Certificate/Lab ID: E87814. NELAP Accredited.

Non-Potable Water (Inorganic Parameters: SM2320B, SM2540D, SM2540G.)

Solid & Chemical Materials (Inorganic Parameters: 6020, 7470, 7471, 9045. Organic Parameters: EPA 8260, 8270, 8082, 8081.)

Air & Emissions (EPA TO-15.)

Louisiana Department of Environmental Quality Certificate/Lab ID: 03090. NELAP Accredited.

Non-Potable Water (Inorganic Parameters: EPA 180.1, 245.7, 1631E, 3020, 6020A, 7470A, 9040, 9050A, SM2320B, 2540D, 2540G, 4500H-B, Organic Parameters: EPA 3510C, 3580A, 3630C, 3640A, 3660B, 3665A, 5030B, 8015D, 3570, 8081B, 8082A, 8260B, 8270C.)

Solid & Chemical Materials (Inorganic Parameters: EPA 1311, 3050, 3051A, 3060A, 6020A, 7196A, 7470A, 7471B, 7474, 9040B, 9045C, 9060. Organic Parameters: EPA 3540C, 3570B, 3580A, 3630C, 3640A, 3660, 3665A, 5035, 8015D, 8081B, 8082A, 8260B, 8270C.)

Biological Tissue (Inorganic Parameters: EPA 6020A. Organic Parameters: EPA 3570, 3510C, 3610B, 3630C, 3640A, 8270C.)

Air & Emissions (EPA TO-15.)

New Hampshire Department of Environmental Services Certificate/Lab ID: 2206. NELAP Accredited.

Non-Potable Water (Inorganic Parameters: EPA, 245.1, 245.7, 1631E, 180.1, 6020A, 7470A, 9040B, 9050A, SM2540D, 2540G, 4500H-B, 2320B. Organic Parameters: EPA 8081, 8082, 8260B, 8270C.)

Solid & Chemical Materials (Inorganic Parameters: SW-846 1311, 1312, 3050B, 3051A, 3060A, 6020A, 7470A, 7471A, 9040B, 9045C, 7196A. Organic Parameters: SW-846 3540C, 3580, 3630C, 3640A, 3660B, 3665A, 5035, 8260B, 8270C, 8015D, 8082, 8081A.)

New Jersey Department of Environmental Protection Certificate/Lab ID: MA015. NELAP Accredited.

Non-Potable Water (Inorganic Parameters: SW-846 1312, 3010, 3020A, 3015, SM2320B, EPA 200.8, SM2540D, 2540G, EPA 120.1, SM2510B, EPA 180.1, 245.1, 1631E, SW-846 7470A, 9040B, 6020, 9010B, 9014 Organic Parameters: SW-846 3510C, 3580A, 5030B, 5035L, 5035H, 3630C, 3640C, 3660B, 3665A, 8015B, 8081A, 8082, 8260B, 8270C)

Solid & Chemical Materials (Inorganic Parameters: SW-846 6020, 9010B, 9014, 1311, 1312, 3050B, 3051, 3060A, 7196A, 7470A, 7471A, 9040B, 9045C, 9060. Organic Parameters: SW-846 3540C, 3570, 3580A, 5030B, 5035L, 5035H, 3630C, 3640A, 3660B, 3665A, 8081A, 8082, 8260B, 8270C, 8015B.)

Atmospheric Organic Parameters (EPA TO-15)

Biological Tissue (Inorganic Parameters: SW-846 6020 Organic Parameters: SW-846 8270C, 3510C, 3570, 3630C, 3640A)

New York Department of Health Certificate/Lab ID: 11627. **NELAP Accredited.**

Non-Potable Water (Inorganic Parameters: SM2320B, SM2540D, EPA 200.8, 6020, 1631E, 245.1, 9014, 9040B, 120.1, SM2510B, 4500CN-E, 4500H-B, EPA 376.2, 180.1, 9010B. Organic Parameters: EPA 8260B, 8270C, 8081A, 8082, 3510C, 5030B.)

Solid & Hazardous Waste (Inorganic Parameters: EPA 6020, 7196A, 3060A, 7471A, 7474, 9014, 9040B, 9045C, 9010B. Organic Parameters: EPA 8260B, 8270C, 8081A, DRO 8015B, 8082, 1311, 1312, 3050B, 3580, 3570, 3051, 5035, 5030B.)

Air & Emissions (EPA TO-15.)

Rhode Island Department of Health Certificate/Lab ID: LAO00299. **NELAP Accredited via LA-DEQ.**

Refer to LA-DEQ Certificate for Non-Potable Water.

Texas Commission of Environmental Quality Certificate/Lab ID: T104704419-08-TX. **NELAP Accredited.**

Solid & Chemical Materials (Inorganic Parameters: EPA 6020, 7470, 7471, 1311, 7196, 9014, 9040, 9045, 9060. Organic Parameters: EPA 8015, 8270, 8260, 8081, 8082.)

Air (Organic Parameters: EPA TO-15)

Washington State Department of Ecology Certificate/Lab ID: C954. *Non-Potable Water* (Inorganic Parameters: SM2540D, 2510B, EPA 120.1, 180.1, 1631E, 245.7.)

Solid & Chemical Materials (Inorganic Parameters: EPA 9040, 9060, 6020, 7470, 7471, 7474. Organic Parameters: EPA 8081, 8082, 8015 Mod, 8270, 8260.)

U.S. Army Corps of Engineers

Department of Defense Certificate/Lab ID: L2217.01.

Non-Potable Water (Inorganic Parameters: EPA 6020A, SM4500H-B. Organic Parameters: 3020A, 3510C, 5030B, 8260B, 8270C, 8270C-ALK-PAH, 8082, 8081A, 8015D-SHC.)

Solid & Hazardous Waste (Inorganic Parameters: EPA 1311, 1312, 3050B, 6020A, 7471A, 9045C, 9060, SM 2540G, ASTM D422-63. Organic Parameters: EPA 3580A, 3570, 3540C, 5035A, 8260B, 8270C, 8270-ALK-PAH, 8082, 8081A, 8015D-SHC, 8015-DRO.

Air & Emissions (EPA TO-15.)

Analytes Not Accredited by NELAP

Certification is not available by NELAP for the following analytes: **8270C**: Biphenyl. **TO-15**: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 2-Methylnaphthalene, 1-Methylnaphthalene.



CHAIN OF CUSTODY

320 Forbes Blvd, Mansfield, MA 02048
TEL: 508-822-9300 FAX: 508-822-3288

Client Information

Client: Jatt Arcadis
Address: 482 Congress St, Suite 501
Portland, ME 04104
Phone: 207-828-0046
Fax: 207-828-0062
Email: Mitch.Wedemeyer@arcadis-us.com
 These samples have been previously analyzed by Alpha

Project Information

Project Name: Unitrust wells G&E
Project Location: Woburn, MA
Project #: MA000909.0002.0003
Project Manager: Nedra Weinberg
ALPHA Quote #:

Turn-Around Time

Standard RUSH (only confirmed if pre-approved!)

Date Due: _____ Time: _____

Report Information - Data Deliverables

FAX
 ADEx
Criteria Checker: _____
(Default based on Regulatory Criteria Indicated)
Other Formats: _____
 EMAIL (standard pdf report)
 Additional Deliverables: _____
Report to: (if different than Project Manager)

Billing Information

Same as Client info PO #: _____

Regulatory Requirements/Report Limits

State/Fed	Program	Criteria

C1108885

Other Project Specific Requirements/Comments:

All Columns Below Must Be Filled Out

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection		Initial Vacuum	Final Vacuum	Sample Matrix*	Sampler's Initials	Can Size	ID Can	ID - Flow Controller	ANALYSIS						Sample Comments (i.e. PID)	
		Date	Start Time								End Time	TO-14A by TO-15	TO-15	TO-15 SIM	APH	FIXED GASES		TO-13A
	AA-10M-1-06162011	6/16	6/17	1702	1713	-29.8"	-10.4"	AA	MW	6L	998	077			X			
	IA-10M-2-06162011	6/16	6/17	1707	1657	-30"	-8.6"	AA	MW	6L	959	248			X			
	IA-10M-1-06162011	6/16	6/17	1711	1648	-29.9"	-6.95"	AA	MW	6L	1592	168			X			
	DUP IA-06162011	6/16	6/17	-	-	-30"	-4.5"	AA	MW	6L	640	286			X			
	SS-10M-1-06172011	6/17	1708	1738	-30"	-6"	SV	MW	6L	1588	245			X				
	SS-10M-2-06172011	6/17	¹⁷¹⁵ 1644	1755	-30"	-6.7"	SV	MW	6L	1644	274			X				
8885.1	TB06182011	6/18	-	-	-	-	AA	MW	6L	1711	373			X				
2	AA-CP-1-06182011	6/18	0305	1454	-30"	-4.4"	AA	MW	6L	947	071			X				
3	AA-CP-2-06182011	6/18	⁰³⁰⁵ 30	1452	-30"	-4.5"	AA	MW	6L	1688	326			X				
4	IA-CP-1-06182011	6/18	⁰³⁰⁰ 30	1503	-30"	-5.8"	AA	MW	6L	1053	147			X				

*SAMPLE MATRIX CODES

AA = Ambient Air (Indoor/Outdoor)
SV = Soil Vapor/Landfill Gas/SVE
Other = Please Specify

Container Type

Relinquished By:

Date/Time

Received By:

Date/Time

[Signature]
Pet Curcio
6/20/11 820

[Signature]
6/20/11 1700

[Signature]
6/20/11 820

[Signature]
6/20/11 1100

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambient issues are resolved. All samples submitted are subject to Alpha's Terms and Conditions. See reverse side.



CHAIN OF CUSTODY

320 Forbes Blvd, Mansfield, MA 02048
TEL: 508-822-9300 FAX: 508-822-3288

PAGE 1 OF 1

Date Rec'd in Lab:

ALPHA JOB #: L1108885

Client Information

Client: **ARCADIS**
Address: **482 Congress St Suite 501
Portland, ME 04101**
Phone: **207-828-0046**
Fax: **207-828-0062**
Email: **Mitch.walsh@arcadis-us.com**

Project Information

Project Name: **Uni First wells G&EP**
Project Location: **Woburn, MA**
Project #: **MA00989-0002-0003**
Project Manager: **Nadine Weinberg**
ALPHA Quote #:

Turn-Around Time

Standard RUSH (only confirmed if pre-approved)

Date Due: Time:

Report Information - Data Deliverables

FAX
 ADEX
Criteria Checker:
(Default based on Regulatory Criteria Indicated)
Other Formats:
 EMAIL (standard pdf report)
 Additional Deliverables:
Report to: (if different than Project Manager)

Billing Information

Same as Client info PO #:

Regulatory Requirements/Report Limits

State/Fed Program Criteria

Other Project Specific Requirements/Comments:

All Columns Below Must Be Filled Out

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection				Initial Vacuum	Final Vacuum	Sample Matrix*	Sampler's Initials	Can Size	ID Can	ID - Flow Controller	TO-14A by TO-15	TO-15	TO-15 SIM	APH	FIXED GASES	TO-13A	TO-4/TO-10	Sample Comments (i.e. PID)
		Date	Start Time	End Time																
8885-5	IA-CP-2-06182011	6/18	0300	1456	-30"	-5.1"	AA	MW	6L	987	500			X						
6	Dup IA 06182011	6/18	-	-	-30"	-4.2"	AA	MW	6L	643	359			X						
7	IA-CP-3-06182011	6/18	0300	1503	-30"	-5.3"	AA	MW	6L	589	367			X						
8	SS-CP-1-06182011	6/18	1603	1638	-30"	-7.3"	SV	MW	6L	1695	300			X						
9	SS-CP-2-06182011	6/18	1515	1546	-24.8"	-6.8"	SV	MW	6L	742	223			X						
10	SS-CP-3-06182011	6/18	1528	1559	-24.6"	-5.5"	SV	MW	6L	1666	298			X						
11	Dup SS 06182011	6/18	-	-	-30"	-25.9"	SV	MW	6L	1587	357			X						Check vacuum and consult with Mitch prior to Analyzing Sample
	FB MW																			

*SAMPLE MATRIX CODES

AA = Ambient Air (Indoor/Outdoor)
SV = Soil Vapor/Landfill Gas/SVE
Other = Please Specify

Container Type

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. All samples submitted are subject to Alpha's Terms and Conditions. See reverse side.

Relinquished By:

Date/Time

Received By:

Date/Time

[Handwritten signatures and dates for Relinquished and Received fields]



AIR ANALYSIS

CHAIN OF CUSTODY

PAGE 1 OF

Date Rec'd in Lab:

ALPHA Job #

320 Forbes Blvd, Mansfield, MA 02048
TEL: 508-822-9300 FAX: 508-822-3288

Project Information

Project Name:
Project Location: Unifirst SU1
Project #:
Project Manager:
ALPHA Quote #:

Report Information - Data Deliverables

FAX
 ADEX
Criteria Checker:
(Default based on Regulatory Criteria Indicated)
Other Formats:
 EMAIL (standard pdf report)
 Additional Deliverables:
Report to: (if different than Project Manager)

Billing Information

Same as Client info PO #:

Client Information

Client: Arcadis
Address:
Phone:
Fax:
Email:

Turn-Around Time

Standard RUSH (only confirmed if pre-approved)

Date Due: Time:

Regulatory Requirements/Report Limits

State/Fed Program Criteria

These samples have been previously analyzed by Alpha

Other Project Specific Requirements/Comments:

Bar. Pres. - 29.88

ANALYSIS

All Columns Below Must Be Filled Out

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection			Initial Vacuum	Final Vacuum	Sample Matrix*	Sampler's Initials	Can Size	I D Can	I D - Flow Controller	TO-14A by TO-15	TO-15	TO-15 SIM	APH	FIXED GASES	TO-13A	TO-4 / TO-10	Sample Comments (i.e. PID)	
		Date	Start Time	End Time																
	Con 959 FC 248	6/13/11			-29.4		AA													
	Con 1592 FC 168				-29.4															
	Con 648 FC 129				-29.4															
	Con 1691 FC 149				-29.4															
	Con 1688 FC 326				-29.4															
	Con 947 FC 071				-29.4															
	Con 640 FC 286				-29.4															
	Con 1619 FC 229				-29.4															
	Con 643 FC 359				-29.4															
	Con 995 FC 481				-29.4															

*SAMPLE MATRIX CODES

AA = Ambient Air (Indoor/Outdoor)
SV = Soil Vapor/Landfill Gas/SVE
Other = Please Specify

Container Type

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. All samples submitted are subject to Alpha's Terms and Conditions. See reverse side.

Relinquished By:

Date/Time

Received By:

Date/Time

R. Gilbert
6/13/11 16:20

6/13/11 16:55

P. Gilbert

6/13/11 16:20

Norm Dulan
6-14-11

6-14-11

Norm Dulan
6-14-11 10:58

6-14-11 10:58

6-14-11 13:15



CHAIN OF CUSTODY

AIR ANALYSIS

PAGE 2 OF _____

320 Forbes Blvd, Mansfield, MA 02048
TEL: 508-822-9300 FAX: 508-822-3288

Date Rec'd in Lab: _____

ALPHA Job #: _____

Project Information

Project Name: _____
Project Location: Unifirst SU1
Project #: _____
Project Manager: _____
ALPHA Quote #: _____

Report Information - Data Deliverables

FAX
 ADEx
Criteria Checker: _____
(Default based on Regulatory Criteria Indicated)
Other Formats: _____
 EMAIL (standard pdf report)
 Additional Deliverables: _____
Report to: (if different than Project Manager) _____

Billing Information

Same as Client info PO #: _____

Client Information

Client: Arcadis
Address: _____
Phone: _____
Fax: _____
Email: _____

Turn-Around Time

Standard RUSH (only confirmed if pre-approved!)

Date Due: _____ Time: _____

Regulatory Requirements/Report Limits

State/Fed	Program	Criteria
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These samples have been previously analyzed by Alpha

Other Project Specific Requirements/Comments: _____

All Columns Below Must Be Filled Out

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection					Sample Matrix*	Sampler's Initials	Can Size	ID Can	ID - Flow Controller	ANALYSIS						Sample Comments (i.e. PID)
		Date	Start Time	End Time	Initial Vacuum	Final Vacuum						TO-14A by TO-15	TO-15	TO-15 SIM	APH	FIXED GASES	TO-13A	
	Can 998 FC 077	6/13/11			-29.4		AA											
	Can 987 FC 500				-29.4													
	Can 1053 FC 147				-29.4													
	Can 1711 FC 373				-29.4													
	Can 575 FC 152				-29.4													
	Can 589 FC 367				-29.4													
	Can 901 FC 131				-29.4													
	Can 686 FC 192				-29.4													
	Can 1666 FC 298				-29.4													
	Can 1587 FC 357				-29.4													

SAMPLE MATRIX CODES

AA = Ambient Air (Indoor/Outdoor)
SV = Soil Vapor/Landfill Gas/SVE
Other = Please Specify

Container Type

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. All samples submitted are subject to Alpha's Terms and Conditions. See reverse side.

Relinquished By:

Date/Time

Received By:

Date/Time

[Signature]
6/13/11 16:20

6/13/11 16:55

[Signature]
6/14/11 10:30

6/14/11 13:15

[Signature]
6-14-

[Signature]

6-14-11 1315

320 Forbes Blvd, Mansfield, MA 02048
 TEL: 508-822-9300 FAX: 508-822-3288

Client Information

Client: Arcadis
 Address: _____
 Phone: _____
 Fax: _____
 Email: _____

Project Information

Project Name: _____
 Project Location: Unit 1st SU1
 Project #: _____
 Project Manager: _____
 ALPHA Quote #: _____

Report Information - Data Deliverables

FAX
 ADEX
 Criteria Checker: _____
(Default based on Regulatory Criteria Indicated)
 Other Formats:
 EMAIL (standard pdf report)
 Additional Deliverables:
 Report to: (if different than Project Manager/)

ALPHA Job #

Billing Information

Same as Client Info
 PO #: _____

Regulatory Requirements/Report Limits

State/Fed Program Criteria

These samples have been previously analyzed by Alpha
 Other Project Specific Requirements/Comments:

All Columns Below Must Be Filled Out

ALPHA LABEL ID (Lab Use Only)	Sample ID	Collection				Sample Matrix*	Sampler's Initials	Can Size	ID Can	ID-Flow Controller	Sample Comments (i.e. PID)
		Date	Start Time	End Time	Vacuum						
	CAN 742 FC 223	6/13/11				SC					
	CAN 748 FC 391										
	CAN 1658 FC 073										
	CAN 1644 FC 279										
	CAN 1669 FC 353										
	CAN 1568 FC 295										
	CAN 1672 FC 293										
	CAN 1565 FC 052										
	CAN 1695 FC 390										

SAMPLE MATRIX CODES

AV = Ambient Air (Indoor/Outdoor)
 SV = Soil Vapor (Indoor/Outdoor)
 Other: _____

Container Type

Relinquished By: _____

Date/Time: _____

Received By: _____

Date/Time: _____

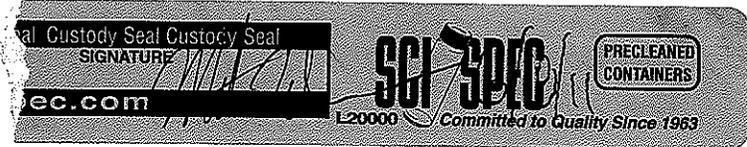
ANALYSIS

- TO-14A by TO-15
- TO-15
- TO-15 SIM
- APH
- FIXED GASES
- TO-13A
- TO-4 / TO-10

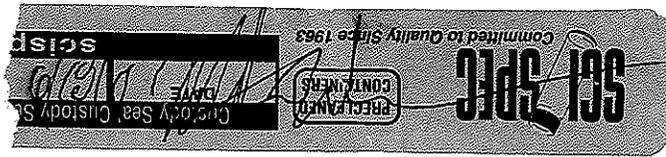
Please print clearly, legibly and completely. Samples can not be logged in and turned around time. Samples will not start until any and all bottles are received. All samples submitted are subject to Alpha's terms and conditions. See reverse side.



only half
seal on crate.
Covering seam.



same as above





Appendix E

Preliminary Human Health Risk
Evaluation Report

UniFirst Corporation

Appendix E

Human Health Risk Evaluation Report – Second Sampling Round

**Commercial Property
Tax ID 26/ 02/ 06
Wells G&H Superfund Site
Woburn, Massachusetts**

August 2011



**Appendix E
Human Health Risk Evaluation
Report – Second Sampling
Round**

Commercial Property
Tax ID 26/ 02/ 06
Wells G&H Superfund Site
Woburn, Massachusetts

Prepared for:
UniFirst Corporation

Prepared by:
ARCADIS U.S., Inc.
482 Congress St
Suite 501
Portland
Maine 04101
Tel 207.828.0046
Fax 207.828.0062

Our Ref.:
MA000989.0002

Date:
August 2011

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Table 2	Commercial Property Indoor Air and Sub-slab Soil Vapor Data with Attenuation Factors
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Table 4	Estimated Risks to Current Children and Workers from Short Term Exposure to Volatile Constituents in Indoor Air via Inhalation
Table 5	Estimated Risks to a Current Worker from Long Term Exposure to Volatile Constituents in Indoor Air via Inhalation
Table 6	Estimated Risks to a Current Child from Long Term Exposure to Volatile Constituents in Indoor Air via Inhalation
Table 7	Estimated Risks to a Hypothetical Resident from Long Term Exposure to Volatile Constituents in Indoor Air via Inhalation

Table 8	Estimated Risks to Current Children and Workers from Short Term Exposure to Volatile Constituents in Indoor Air via Inhalation – Combined Results
Table 9	Estimated Risks to a Current Worker from Long Term Exposure to Volatile Constituents in Indoor Air via Inhalation – Combined Results
Table 10	Estimated Risks to a Current Child from Long Term Exposure to Volatile Constituents in Indoor Air via Inhalation – Combined Results
Table 11	Estimated Risks to a Hypothetical Resident from Long Term Exposure to Volatile Constituents in Indoor Air via Inhalation – Combined Results

Attachments

Attachment A	Risk Tables
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Commercial Property
Tax ID 26/ 02/ 06
Wells G&H Superfund Site
Woburn, Massachusetts

1. Introduction

ARCADIS has prepared a preliminary human health risk assessment based upon validated indoor air data presented in Table 1 of the Indoor Air Quality and Vapor Intrusion Assessment: Report of Second Round of Sampling Results from samples collected on June 18, 2011 at the commercial property identified in the tax assessors' records as Woburn Parcel Number 26/02/06 (the Commercial Property). The list of compounds of potential concern (COPCs) is in accordance with Table 1 of the *Indoor Air Quality and Vapor Intrusion Assessment Scope of Work (SOW)* (The Johnson Company [JCO] 2010a) submitted to the U.S. Environmental Protection Agency (USEPA) by The Johnson Company on behalf of the UniFirst Corporation in March 2010 and Table 2 of *Indoor Air Quality and Vapor Intrusion Assessment: Report of Results (IAQA/VI)* (JCO 2010b). COPCs that were detected in any indoor air sample were considered in the risk assessment.

2. Comparison to Acute Exposure Criteria

In order to screen for potential near-term human health hazards, indoor air data from June 2011 were compared to two sets of acute exposure criteria, including Acute Minimal Risk Levels (MRLs) and Acute Exposure Guideline Levels (AEGLs). In addition, indoor air data were compared to occupational criteria, including Permissible Exposure Limits (PELs) and Threshold Limit Values (TLVs®) (Table 1). Acute inhalation MRLs are derived by the Agency for Toxic Substances and Disease Registry (ATSDR) for noncarcinogenic effects from exposures lasting 14 days or less. AEGLs are set by USEPA for infrequent or one-time exposures to airborne compounds. An eight-hour AEGL-1 represents a level above which it is expected that the general population could experience significant but reversible irritation or discomfort. PELs are federal standards enforceable by the Occupational Safety and Health Administration (OSHA) for an eight-hour time-weighted average occupational exposure. TLVs® are eight-hour time-weighted averages proposed by the American Conference of Governmental Industrial Hygienists (ACGIH) for occupational hazard assessment. If no acute exposure criteria or occupational criteria were available for a given compound, surrogate values were used where appropriate (Table 1). Comparisons were based on individual samples (i.e., assuming that an individual person would consistently remain at the sample location throughout the relevant exposure period).

No June 2011 result exceeded acute exposure criteria. Thus, acute indoor air exposures to the COPCs would not pose significant risks of harm to human health.



Commercial Property
Tax ID 26/ 02/ 06
Wells G&H Superfund Site
Woburn, Massachusetts

3. Risk Evaluation

Indoor air, outdoor air, and sub-slab soil vapor samples were collected on June 18, 2011 (Table 2) from the Commercial Property. Sub-slab soil vapor and indoor air samples were collected from three locations on the first floor of the building on the Commercial Property. Analytical results indicate that 15 constituents were detected in indoor air. Of these 15 constituents, 1,2-dichloroethane, 1,3-butadiene, 1,4-dichlorobenzene, benzene, ethylbenzene, naphthalene, and xylenes were detected only in indoor air indicating that concentrations detected are associated with background sources in the building. Eight of the 15 constituents detected in indoor air were detected in sub-slab soil vapor, including 1,1,1-trichloroethane, 1,2,4-trimethylbenzene, bromodichloromethane, carbon tetrachloride, chloroform, methylene chloride, tetrachloroethene, and toluene.

Attenuation factors (AFs) were calculated for the eight constituents detected in both indoor air and sub-slab soil vapor (Table 2). The AFs for 1,2,4-trimethylbenzene, carbon tetrachloride, and toluene exceeded 1.0. In addition, the AFs for bromodichloromethane, chloroform, and methylene chloride had AFs between 0.1 and 0.4, indicating that background sources are present in the building. Five chemicals were detected only in sub-slab soil vapor; these include 1,1-dichloroethane, cis-1,2-dichloroethene, methyl tert butyl ether, trans-1,2-dichloroethene, and trichloroethene. Carbon tetrachloride, methylene chloride, and naphthalene were also detected in similar concentrations in outdoor air samples collected outside the building on the Commercial Property.

During pre-sampling activities, ARCADIS staff conducted a building survey to document building conditions and products that were found in the portion of the building on the Commercial Property where indoor air sampling was conducted. The following potential background sources were identified during the survey:

- Many cleaning and disinfecting products were observed. Products included Clorox® cleaning wipes, Windex®, and glass wipes.
- Several Rust-Oleum® products were identified during the survey that contained toluene, xylene, and acetone.

In addition, one worker is known to smoke outside the building.



Commercial Property
Tax ID 26/ 02/ 06
Wells G&H Superfund Site
Woburn, Massachusetts

Risks from inhalation of volatile organic compounds in indoor air were estimated for a current daycare child and worker for both long- and short-term exposures, and for a hypothetical future resident for a long-term exposure. Exposure assumptions were based on current USEPA guidance (USEPA 2009) and discussions with project staff knowledgeable of building use patterns (Table 3).

In accordance with USEPA guidance, long-term exposure was defined as 25 years for a daycare worker and 30 years for a hypothetical future resident. Long-term exposure for the child is defined as seven years based on the ages of children that the daycare center accepts. This risk assessment assumes that the child enters the daycare center at the youngest possible age and stays until the oldest possible age. The short-term exposure was performed for a five-year exposure in accordance with Massachusetts Department of Environmental Protection (MADEP) guidance for Imminent Hazard (IH) evaluations to determine if an IH condition existed as defined in the Massachusetts Contingency Plan (MCP) (MADEP 2008). As specified in the MCP, the IH evaluation was performed for current use receptors: current daycare children and workers.

For each constituent, the exposure point concentration in indoor air is equal to the average concentration of the three indoor air results. Non detected results were not used in the calculations. A current daycare worker or child was assumed to be present in the sampled areas for 11 hours per day; the maximum span the daycare center is open each day. Hypothetical future residents were assumed to be present 24 hours per day in the building. Exposure parameters for each scenario are presented in Table 3.

Risks were estimated according to USEPA guidance (USEPA 2009) and the MCP (MADEP 2008). Volatile organic compounds in indoor air were not considered to pose significant cumulative risk to human health if they were within or below the USEPA Superfund target excess lifetime cancer risk range of 1×10^{-6} to 1×10^{-4} and the noncancer target Hazard Index (HI) of 1. The criteria applicable to the MADEP IH evaluation are a target excess lifetime cancer risk of 1×10^{-5} for potential carcinogenic effects and a target Hazard Index (HI) of 1 for potential noncarcinogenic effects.

The risk assessment was executed on all constituents that were detected in at least one indoor air sample, including several constituents that have been demonstrated *not* to be site-related, such as 1,2,4-trimethylbenzene, 1,2-dichloroethane, 1,3-butadiene, 1,4-dichlorobenzene, benzene, bromodichloromethane, carbon tetrachloride, chloroform, ethylbenzene, methylene chloride, naphthalene, toluene, and xylenes. These constituents are present as a result of sources within the building and are not



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within the scope of a release to the environment addressed under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Chloroform was present in subslab vapor and in indoor air, but the primary sources of chloroform were cleaning products used inside the building.

Risks from the initial sampling event at this building (March 12, 2011) were presented in the Appendix E of the Indoor Air Quality and Vapor Intrusion Assessment: Report of Results submitted to USEPA on April 28, 2011. To evaluate potential risks over both the initial and current sampling event, risks were calculated considering chemicals detected in indoor air from both events. Any constituent that was detected in indoor air in either the March or June event was included in the combined risk calculation. Risks associated with both data sets are referred to as "Combined Results" below.

4. Current Results

No indoor air sample exceeded acute exposure criteria or occupational criteria, and acute indoor air exposures to the COPCs are not estimated to pose significant risks to human health.

4.1 Current Child & Worker Scenario (Short-Term)

As presented in Table 4, the cumulative estimated lifetime cancer risks for a short-term (5-year) exposure period to a current daycare child and worker exposed to the COPCs detected in indoor air in the Commercial Property did not exceed the MADEP IH target risk level of 1×10^{-5} (Table 4). All non-cancer hazards are also below 1 for this exposure scenario. No IH condition as defined by the MCP was found to exist at the commercial property for the short-term child or worker exposure scenario.

All short-term risks to COPCs in indoor air were within the Superfund target excess lifetime cancer risk range of 1×10^{-6} to 1×10^{-4} and no individual chemical risks exceeded 3×10^{-6} (Table 4). It should be noted that the majority of risk (70%) was due to exposure to chloroform and benzene which are likely to be present in indoor air from background sources. Risks associated with PCE only account for 3% of the total risk, or an estimated risk level of 2×10^{-7} .

4.2 Current Worker Scenario (Long-Term)

Cumulative estimated lifetime cancer risks for a long-term (25-year) exposure period to a current daycare worker exposed to COPCs in indoor air were within the Superfund



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target excess lifetime cancer risk range of 1×10^{-6} to 1×10^{-4} and no individual chemical exceeded 1×10^{-5} . All non-cancer hazards are also below 1 for this exposure scenario (Table 5). Again, the majority of risk (70%) was due to exposure to chloroform and benzene which are likely to be present in indoor air from background sources. Risks associated with PCE (8×10^{-7}) only account for 3% of the total risk.

4.3 Current Child Scenario (Long-Term)

Cumulative estimated cancer risks for current daycare child exposed to COPCs in indoor air over a long-term (seven-year) exposure period were within the Superfund target excess lifetime cancer risk range of 1×10^{-6} to 1×10^{-4} and no individual chemical exceeded 4×10^{-6} (Table 6). All non-cancer hazards are also below 1 for this exposure scenario (Table 6). Chloroform and benzene continue to drive the estimated risk level, making up 70% of risk. The risk associated with exposure to PCE in indoor air accounts for only 3% of the total risk and is 2×10^{-7} for the long term daycare child.

4.4 Hypothetical Future Resident Scenario (Long-Term)

Cumulative estimated lifetime cancer risks for a hypothetical future resident exposed to COPCs in indoor for a long-term (30-year) exposure period did not exceed the Superfund target excess lifetime cancer risk range of 1×10^{-6} to 1×10^{-4} and no individual chemical exceeded 5×10^{-5} (Table 7). All non-cancer hazards are also below 1 for the hypothetical future resident (Table 7). The risk associated with long term exposure to PCE is 3×10^{-6} to the hypothetical resident. Chloroform and benzene continue to drive risk levels, making up 70% of risks.

5. Combined Results

The results from the March 2011 and June 2011 data were combined to determine the potential overall risk from exposure to constituents detected in indoor air.

5.1 Current Child & Worker Scenario (Short-Term)

Table 8 presents the results of the combined indoor air data evaluation. The cumulative estimated lifetime cancer risks to a current daycare child and worker exposed to indoor air COPCs over a short term duration (5-years) did not exceed the MADEP IH target risk level of 1×10^{-5} (Table 8). All non-cancer hazards are also below 1 for this exposure scenario. No IH condition as defined by the MCP was found to exist at the Commercial Property for the short-term child or worker exposure scenario.



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All risks to COPCs in indoor air were within the Superfund target excess lifetime cancer risk range of 1×10^{-6} to 1×10^{-4} and no individual chemical risks exceeded 2×10^{-6} (Table 8). It should be noted that for both sampling events the majority of risk (62%) was due to exposure to chloroform which is likely to be present in indoor air from background sources including chlorinated cleaning products. Risks associated with PCE only account for 4% of the total risk, or an estimated risk level of 1×10^{-7} over both events.

5.2 Current Worker Scenario (Long-Term)

Cumulative estimated lifetime cancer risks were also evaluated using all the data for a current daycare worker exposed for 25-years (long term). All COPCs in indoor air were within the Superfund target excess lifetime cancer risk range of 1×10^{-6} to 1×10^{-4} and no individual chemical exceeded 1×10^{-5} . All non-cancer hazards are also below 1 for this exposure scenario (Table 9). Again, the majority of risk (71%) for both events was due to exposure to chloroform and benzene which is likely to be present in indoor air from background sources. Risks associated with PCE only account for 4% of the total risk or a risk level of 7×10^{-7} .

5.3 Current Child Scenario (Long-Term)

Cumulative estimated cancer risks for a current daycare child exposed to COPCs in indoor over a long-term (seven-year) period were within the Superfund target excess lifetime cancer risk range of 1×10^{-6} to 1×10^{-4} and no individual chemical exceeded 3×10^{-6} (Table 10). All non-cancer hazards are also below 1 for this exposure scenario (Table 10). Chloroform and benzene continue to drive the estimated risk level for both events, making up 71% of risk. The risk associated with exposure to PCE in indoor air accounts for only 4% of the total risk and is 2×10^{-7} for the long term daycare child.

5.4 Hypothetical Future Resident Scenario (Long-Term)

Cumulative estimated lifetime cancer risks for a long-term (30-year) exposure period to a hypothetical future resident exposed to COPCs in indoor air did not exceed the Superfund target excess lifetime cancer risk range of 1×10^{-6} to 1×10^{-4} and no individual chemical exceeded 4×10^{-5} (Table 11). All non-cancer hazards are also below 1 for the hypothetical future resident (Table 11). The risk associated with long term exposure to PCE by the hypothetical resident 3×10^{-6} using all the indoor air sampling data. Chloroform and benzene continue to drive risk levels, making up 71% of risks.



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6. Conclusions and Recommendations

In the June 2011 sampling round, no indoor air sample exceeded acute exposure criteria or occupational criteria, and acute indoor air exposures to the COPCs are not estimated to pose significant risks to human health. Cumulative estimated carcinogenic and noncarcinogenic risks for current daycare children and workers did not exceed target risk levels for a short-term (5-year) exposure period. No IH condition as defined by the MCP was found to exist at the Commercial Property.

Long term estimated excess lifetime carcinogenic risks for current daycare children (seven years), daycare workers (25 years), and hypothetical residents (30 years) are all within the Superfund target excess lifetime cancer risk range of 1×10^{-6} to 1×10^{-4} considering average indoor air concentrations and do not exceed 1×10^{-4} under any exposure scenario. All non-cancer HIs are below 1. All supporting risk assessment tables are provided in Attachment A.

PCE was detected in the June 2011 sampling round at low levels (1.09 to $1.23 \mu\text{g}/\text{m}^3$) that are consistent with background sources in residences throughout the United States. USEPA's indoor air background database reported a 50th percentile value of $0.7 \mu\text{g}/\text{m}^3$, a 75th percentile value of $1.4 \mu\text{g}/\text{m}^3$ and a 90th percentile value of $3.8 \mu\text{g}/\text{m}^3$ for PCE (Dawson 2008). The potential carcinogenic risk level estimated for a worker exposed to these low levels of PCE at the building for 25 years working 11-hour days is 8×10^{-7} , a level of risk that is well below even the most conservative end of USEPA's risk range for Superfund sites. The estimated total risk, including exposure to other compounds in the building originating from background sources, is 2×10^{-5} , primarily due to chloroform and benzene. The PCE concentrations measured in the Commercial Property also are below the MADEP Threshold Value (TV) for PCE ($1.4 \mu\text{g}/\text{m}^3$). According to MADEP, when compounds of concern are measured in indoor air at levels that are below TVs, it can reasonably be concluded that a complete vapor intrusion pathway does not exist.

The risk evaluation of the combined data confirms the results reported above and in the previous (April 28, 2011) human health risk assessment. Using all the data, the overall risk level was similar for the long-term worker scenario to the current data set. In all cases, chloroform and naphthalene are the primary risk drivers in indoor air and PCE only accounts for a small percentage (3-4%) of the overall risk level.

Concentrations of background constituents including 1,2,4-trimethylbenzene, 1,2-dichloroethane, 1,3-butadiene, benzene, bromodichloromethane, chloroform, ethylbenzene, methylene chloride, toluene, and xylenes detected in both indoor air



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sampling events were slightly higher in June 2011 than in March 2011. These constituents however were either not detected, or were detected at similar or lower concentrations in sub-slab soil vapor (see Section 3.3 of the Indoor Air Quality and Vapor Intrusion Assessment). Concentrations of PCE in indoor air were similar in both events (i.e., March 2011 PCE average = 1.11 $\mu\text{g}/\text{m}^3$; June 2011 PCE average = 1.15 $\mu\text{g}/\text{m}^3$) despite the fact that concentrations of PCE in sub-slab soil vapor were slightly higher in the second sampling event (i.e., March 2011 PCE average = 1,921 $\mu\text{g}/\text{m}^3$; June 2011 PCE average = 2,665 $\mu\text{g}/\text{m}^3$).

7. References

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- Massachusetts Department of Environmental Protection (MADEP). 2008. Massachusetts Contingency Plan, 310 CMR 40.0000. Bureau of Waste Site Cleanup. February 2008.
- U.S. Environmental Protection Agency (USEPA). 2009. Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part F, Supplemental Guidance for Inhalation Risk Assessment). Office of Superfund Remediation and Technology Innovation. EPA-540-R-070-002. January.

Table 1. Acute and Occupational Exposure Criteria for COPCs Detected in Indoor Air

Compound	ATSDR MRL	USEPA AEGL	OSHA PEL	ACGIH TLV
1,1,1-Trichloroethane	1.09E+04	1.25E+06	1.90E+06	NA
1,2,4-Trimethylbenzene	NA	2.21E+05	NA	1.23E+05
1,2-Dichloroethane	NA	NA	2.02E+05	NA
1,3-Butadiene	2.21E+02	1.48E+06	2.21E+03	4.42E+03
1,4-Dichlorobenzene	1.20E+04	NA	2.71E+06	6.01E+04
Benzene	2.87E+01	2.87E+04	3.19E+04	1.60E+03
Bromodichloromethane	NA	NA	NA	NA
Carbon tetrachloride	NA	1.20E+05	6.30E+04	3.15E+04
Chloroform	4.87E+02	1.41E+05	2.40E+05	4.87E+04
Ethylbenzene	4.34E+04	1.43E+05	4.35E+05	4.34E+05
Methylene chloride	2.09E+03	2.09E+05	8.69E+04	1.74E+05
Naphthalene	NA	NA	5.00E+04	5.24E+04
Tetrachloroethene	1.36E+03	2.38E+05	6.79E+05	1.70E+05
Toluene	3.76E+03	7.53E+05	7.53E+05	7.53E+04
Xylenes	8.67E+03	5.64E+05	4.35E+05	4.34E+05

Notes:

All levels in $\mu\text{g}/\text{m}^3$. Levels reported in parts per million (ppm) were first converted to mg/m^3 :

(level in ppm)*(molecular weight)/24.45.

COPC = compounds of potential concern

NA = value not available

ATSDR MRL = Agency for Toxic Substances and Disease Registry Minimum Risk Level (acute inhalation exposure)

USEPA AEGL = U.S. Environmental Protection Agency Acute Exposure Guideline Level (8-hour AEGL 1, AEGL 2 if AEGL 1 not reported)

OSHA PEL = Occupational Safety and Health Administration Permissible Exposure Limits (29 CFR 1910 Subpart Z)

ACGIH TLV = American Conference of Governmental Industrial Hygienists Threshold Limit Value® (time-weighted average).

Table 2. Commercial Indoor Air and Sub-slab Soil Vapor Data with Attenuation Factors

Sample Name: Date Collected:	Units	IA-1 6/18/2011	IA-2 6/18/2011	IA-3 6/18/2011	Average Detected Concentration Indoor Air	SS-1 6/18/2011	SS-2 6/18/2011	SS-3 6/18/2011	Average Detected Concentration Sub- Slab Soil Vapor	AA-1 6/18/2011	AA-2 6/18/2011	Average Attenuation Factor (a)
1,1,1-Trichloroethane	µg/m ³	0.109	0.109 [0.109 U]	0.109 U	0.109	8.4 [7.69]	38.2	12.1	19	0.109 U	0.109 U	0.006
1,1,2-Trichloroethane	µg/m ³	0.109 U	0.109 U [0.109 U]	0.109 U	ND	0.218 U [0.6 U]	1.09 U	0.218 U	ND	0.109 U	0.109 U	NA
1,1-Dichloroethane	µg/m ³	0.081 U	0.081 U [0.081 U]	0.081 U	ND	0.518 [0.445 U]	0.809 U	0.162 U	0.518	0.081 U	0.081 U	NA
1,1-Dichloroethene	µg/m ³	0.079 U	0.079 U [0.079 U]	0.079 U	ND	0.158 U [0.436 U]	0.793 U	0.158 U	ND	0.079 U	0.079 U	NA
1,2,4-Trimethylbenzene	µg/m ³	2.13	2.3 [2.67]	2.69	2.44	0.197 U [0.624]	0.983 U	0.197 U	0.624	0.241	0.142	3.9
1,2-Dibromoethane	µg/m ³	0.154 U	0.154 U [0.154 U]	0.154 U	ND	0.307 U [0.845 U]	1.54 U	0.307 U	ND	0.154 U	0.154 U	NA
1,2-Dichloroethane	µg/m ³	0.308	0.081 U [0.081 U]	0.368	ND	0.162 U [0.445 U]	0.809 U	0.162 U	ND	0.081 U	0.081 U	NA
1,2-Dichloropropane	µg/m ³	0.092 U	0.092 U [0.092 U]	0.092 U	ND	0.185 U [0.508 U]	0.924 U	0.185 U	ND	0.092 U	0.092 U	NA
1,3-Butadiene	µg/m ³	0.077 J	0.1 J [0.1 J]	0.077 J	0.0847	0.089 UJ [0.243 UJ]	0.442 UJ	0.089 UJ	ND	0.044 UJ	0.044 UJ	NA
1,3-Dichlorobenzene	µg/m ³	0.12 U	0.12 U [0.12 U]	0.12 U	ND	0.24 U [0.661 U]	1.2 U	0.24 U	ND	0.12 U	0.12 U	NA
1,4-Dichlorobenzene	µg/m ³	0.18	0.168 [0.186]	0.168	0.175	0.24 U [0.661 U]	1.2 U	0.24 U	ND	0.12 U	0.12 U	NA
Benzene	µg/m ³	3.18	3.19 [3.14]	3.07	3.14	0.447 U [1.23 U]	2.24 U	0.447 U	ND	0.224 U	0.224 U	NA
Bromodichloromethane	µg/m ³	0.315	0.328 [0.315]	0.315	0.317	2.57 [2.32]	1.34 U	0.482	1.46	0.134 U	0.134 U	0.2
Bromoform	µg/m ³	0.207 U	0.207 U [0.207 U]	0.207 U	ND	0.414 U [1.14 U]	2.07 U	0.414 U	ND	0.207 U	0.207 U	NA
Carbon Tetrachloride	µg/m ³	0.704	0.679 [0.66]	0.679	0.684	0.252 U [0.692 U]	1.26 U	0.302	0.302	0.447	0.459	2.3
Chlorobenzene	µg/m ³	0.092 U	0.092 U [0.092 U]	0.092 U	ND	0.184 U [0.506 U]	0.921 U	0.184 U	ND	0.092 U	0.092 U	NA
Chloroform	µg/m ³	5.27	5.13 [4.79]	5.57	5.27	58.6 [58.6]	28.9	32.7	40	0.098 U	0.098 U	0.1
cis-1,2-Dichloroethene	µg/m ³	0.079 U	0.079 U [0.079 U]	0.079 U	ND	0.285 [0.436 U]	0.793 U	0.158 U	0.285	0.079 U	0.079 U	NA
Ethylbenzene	µg/m ³	3.47 J	3.56 J [3.68 J]	3.57 J	3.55	0.174 UJ [0.478 UJ]	0.869 UJ	0.174 UJ	ND	0.091 J	0.087 UJ	NA
Isopropylbenzene	µg/m ³	2.46 U	2.46 U [2.46 U]	2.46 U	ND	4.92 U [13.6 U]	24.6 U	4.92 U	ND	2.46 U	2.46 U	NA
Methyl tert butyl ether	µg/m ³	0.072 UJ	0.072 UJ [0.072 UJ]	0.072 UJ	ND	0.144 UJ [0.815 J]	0.721 UJ	0.144 UJ	0.815	0.072 UJ	0.072 UJ	NA
Methylene Chloride	µg/m ³	6.81	3.26 [3]	2.89	4.28	3.47 U [11.3]	17.4 U	3.47 U	11.3	3.29	3.96	0.4
Naphthalene	µg/m ³	0.603 J	0.587 J [0.514 J]	0.603 J	0.586	0.524 UJ [1.45 UJ]	2.62 UJ	0.524 UJ	ND	2.86 J	0.157 J	NA
Tetrachloroethene	µg/m ³	1.09	1.13 [1.23]	1.19	1.15	1100 [1190]	5730	1120	2665	0.136 U	0.136 U	0.0004
Toluene	µg/m ³	27.9 J	29 J [27.2 J]	27 J	27.7	0.377 UJ [1.22 J]	1.88 UJ	0.377 UJ	1.22	0.637 J	0.724 J	22.7
trans-1,2-Dichloroethene	µg/m ³	0.079 U	0.079 U [0.079 U]	0.079 U	ND	0.285 [0.436 U]	0.793 U	0.158 U	0.285	0.079 U	0.079 U	NA
trans-1,3-Dichloropropene	µg/m ³	0.091 U	0.091 U [0.091 U]	0.091 U	ND	0.182 U [0.499 U]	0.908 U	0.182 U	ND	0.091 U	0.091 U	NA
Trichloroethene	µg/m ³	0.107 U	0.107 U [0.107 U]	0.107 U	ND	25.7 [23.8]	4.46	0.709	10	0.107 U	0.107 U	NA
Vinyl Chloride	µg/m ³	0.051 U	0.051 U [0.051 U]	0.051 U	ND	0.102 U [0.281 U]	0.511 U	0.102 U	ND	0.051 U	0.051 U	NA
Xylenes	µg/m ³	18.8	19 [19.9]	19.3	19.2	0.521 U [1.44 U]	2.61 U	0.521 U	ND	0.33	0.304	NA

Notes:

(a) Attenuation Factor calculated as the ratio of the average detected indoor air to average detected sub-slab soil vapor concentration

J - Indicates an estimated value

µg/m³ - Micrograms per cubic meter

IA - Indoor air sample

AA - Ambient air sample

SS - Sub-slab soil vapor sample

NA - Not applicable

ND - Not detected

[0.109 U] - duplicate results presented in brackets

Bold - Value given is detected concentration only, as compound was detected in one sample only



Table 3. Exposure Assumptions for the Estimation of Risks from Inhalation of Volatile Constituents in Indoor Air

Current Worker

Parameter	Units	Current Worker – Long Term			Current Worker – Short Term		
		Value	Source	Comment	Value	Source	Comment
Exposure Time	hours/day	11	(a)	5 days/week, 50 weeks/year	11	(a)	5 days/week, 50 weeks/year
Exposure Frequency	days/year	250	(a)	5 days/week, 50 weeks/year	250	(a)	5 days/wk, 50 weeks/year
Exposure Duration	years	25	(b)		5	(c)	MADEP IH
Averaging Time – Cancer	hours	613200	(b)		613200	(b)	
Averaging Time – Non-Cancer	hours	219000	(b)		43800	(b)	

Current Child

Parameter	Units	Current Child – Long Term			Current Child – Short Term		
		Value	Source	Comment	Value	Source	Comment
Exposure Time	hours/day	11	(a)	5 days/week, 50 weeks/year	11	(a)	5 days/week, 50 weeks/year
Exposure Frequency	days/year	250	(a)	5 days/week, 50 weeks/year	250	(a)	5 days/week, 50 weeks/year
Exposure Duration	years	7	(b)		5	(c)	MADEP IH
Averaging Time – Cancer	hours	613200	(b)		613200	(b)	
Averaging Time – Non-Cancer	hours	219000	(b)		43800	(b)	

Hypothetical Future Resident

Parameter	Units	Hypothetical Future Resident – Long Term		
		Value	Source	Comment
Exposure Time	hours/day	24	(b)	
Exposure Frequency	days/year	350	(b)	
Exposure Duration	years	30	(b)	
Averaging Time – Cancer	hours	613200	(b)	
Averaging Time – Non-Cancer	hours	262800	(b)	

Notes:

(a) Maximum duration daycare center is open, from discussion with owner

(b) USEPA 2009

(c) MADEP 2008

MADEP IH = Massachusetts Department of Environmental Protection guidance for Imminent Hazard evaluations

Table 4. Estimated Risks to Current Children and Workers from Short Term Exposure to Volatile Constituents in Indoor Air via Inhalation

Parameter	Definition	Units	Value
ET	Indoor Air Exposure Time	hours/day	11
EF	Indoor Air Exposure Frequency	days/yr	250
ED	Indoor Air Exposure Duration	years	5
ATc	Indoor Air Averaging Time - Cancer	hours	613200
ATn	Indoor Air Averaging Time - Non-Cancer	hours	43800
CF	Conversion Factor	ug/mg	1000

Compound	EPC (a) Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	ADE-nc mg/m3	Cancer Risk Indoor Air (unitless)	HI Indoor Air (unitless)	% of Total Cancer Risk (unitless)	% of Total Noncancer HI (unitless)
1,1,1-Trichloroethane	8.18E-05	5	NA	NA	2.57E-05	NA	0.00001	NA	0.00%
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	NA	NA
1,1-Dichloroethane	ND	NA	0.0000016	ND	ND	ND	ND	NA	NA
1,1-Dichloroethene	ND	0.2	NA	ND	ND	ND	ND	NA	NA
1,2,4-Trimethylbenzene	2.44E-03	0.007	NA	NA	7.64E-04	NA	0.11	NA	36%
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	NA	NA
1,2-Dichloroethane	2.39E-04	2.4	0.000026	5.36E-06	7.50E-05	1E-07	0.00003	3%	0.01%
1,2-Dichloropropane	ND	0.004	0.0001	ND	ND	ND	ND	NA	NA
1,3-Butadiene	8.47E-05	0.002	0.00003	1.90E-06	2.66E-05	6E-08	0.01	1%	4%
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	NA	NA
1,4-Dichlorobenzene	1.75E-04	0.8	0.000011	3.92E-06	5.49E-05	4E-08	0.0001	1%	0.02%
Benzene	3.14E-03	0.03	0.0000078	7.04E-05	9.85E-04	5E-07	0.03	12%	11%
Bromodichloromethane	3.17E-04	NA	0.000037	7.11E-06	NA	3E-07	NA	6%	NA
Bromoform	ND	NA	0.0000011	ND	ND	ND	ND	NA	NA
Carbon tetrachloride	6.84E-04	0.1	0.000006	1.53E-05	2.15E-04	9E-08	0.002	2%	1%
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	NA	NA
Chloroform	5.27E-03	0.098	0.000023	1.18E-04	1.65E-03	3E-06	0.02	58%	6%
cis-1,2-Dichloroethene	ND	0.035	NA	ND	ND	ND	ND	NA	NA
Ethylbenzene	3.55E-03	1	0.0000025	7.97E-05	1.12E-03	2E-07	0.001	4%	0.4%
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	NA	NA
Methylene chloride	4.28E-03	1	0.00000047	9.59E-05	1.34E-03	5E-08	0.001	1%	0.4%
Methyl tert butyl ether	ND	3	0.00000026	ND	ND	ND	ND	NA	NA
Naphthalene	5.86E-04	0.003	0.000034	1.31E-05	1.84E-04	4E-07	0.06	9%	20%
Tetrachloroethene	1.15E-03	0.27	0.0000059	2.59E-05	3.62E-04	2E-07	0.001	3%	0.4%
Toluene	2.77E-02	5	NA	NA	8.69E-03	NA	0.002	NA	1%
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	NA	NA
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	NA	NA
Trichloroethene	ND	NA	0.000002	ND	ND	ND	ND	NA	NA
Vinyl chloride	ND	0.1	0.0000044	ND	ND	ND	ND	NA	NA
Xylenes	1.92E-02	0.1	NA	NA	6.02E-03	NA	0.06	NA	20%
Total						5E-06	0.3	100%	100%

$$ADE = \frac{EPC_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{ADE}{RfC}$$

$$Risk = ADE \times URF \times CF$$

Notes:

- (a) EPC calculated as average of detected concentrations and one-half indoor air detection limit for non-detects.
- EC = exposure concentration
- EPC = exposure point concentration
- RfC - reference concentration
- URF - unit risk factor
- ADE-c - average daily exposure (cancer)
- ADE-nc - average daily exposure (noncancer)
- HI - noncancer hazard index
- ug/mg3 - microgram per cubic milligram
- NA - Not available
- ND - Not detected
- mg/m3 - milligram per cubic meter

Table 5. Estimated Risks to a Current Worker from Long Term Exposure to Volatile Constituents in Indoor Air via Inhalation

Parameter	Definition	Units	Value
ET	Indoor Air Exposure Time	hours/day	11
EF	Indoor Air Exposure Frequency	days/yr	250
ED	Indoor Air Exposure Duration	years	25
ATc	Indoor Air Averaging Time - Cancer	hours	613200
ATn	Indoor Air Averaging Time - Non-Cancer	hours	219000
CF	Conversion Factor	ug/mg	1000

Compound	EPC (a) Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	ADE-nc mg/m3	Cancer Risk Indoor Air (unitless)	HI Indoor Air (unitless)	% of Total Cancer Risk (unitless)	% of Total Noncancer HI (unitless)
1,1,1-Trichloroethane	8.18E-05	5	NA	NA	2.57E-05	NA	0.000005	NA	0.00%
1,1,2-Trichloroethane	ND	NA	1.6E-05	ND	ND	ND	ND	NA	NA
1,1-Dichloroethane	ND	NA	1.6E-06	ND	ND	ND	ND	NA	NA
1,1-Dichloroethene	ND	0.2	NA	ND	ND	ND	ND	NA	NA
1,2,4-Trimethylbenzene	2.44E-03	0.007	NA	NA	7.64E-04	NA	0.1	NA	36%
1,2-Dibromoethane	ND	0.009	6.0E-04	ND	ND	ND	ND	NA	NA
1,2-Dichloroethane	2.39E-04	2.4	2.6E-05	2.68E-05	7.50E-05	7E-07	0.00003	3%	0.01%
1,2-Dichloropropane	ND	0.004	1.0E-05	ND	ND	ND	ND	NA	NA
1,3-Butadiene	8.47E-05	0.002	3.0E-05	9.49E-06	2.66E-05	3E-07	0.01	1%	4%
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	NA	NA
1,4-Dichlorobenzene	1.75E-04	0.8	1.1E-05	1.96E-05	5.49E-05	2E-07	0.0001	1%	0.02%
Benzene	3.14E-03	0.03	7.8E-06	3.52E-04	9.85E-04	3E-06	0.03	12%	11%
Bromodichloromethane	3.17E-04	NA	3.7E-05	3.56E-05	NA	1E-06	NA	6%	NA
Bromoform	ND	NA	1.1E-06	ND	ND	ND	ND	NA	NA
Carbon tetrachloride	6.84E-04	0.1	6.0E-06	7.67E-05	2.15E-04	5E-07	0.002	2%	1%
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	NA	NA
Chloroform	5.27E-03	0.098	2.3E-05	5.90E-04	1.65E-03	1E-05	0.02	58%	6%
cis-1,2-Dichloroethene	ND	0.035	NA	ND	ND	ND	ND	NA	NA
Ethylbenzene	3.55E-03	1	2.5E-06	3.98E-04	1.12E-03	1E-06	0.001	4%	0.4%
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	NA	NA
Methylene chloride	4.28E-03	1	4.7E-07	4.79E-04	1.34E-03	2E-07	0.001	1%	0.4%
Methyl tert butyl ether	ND	3	2.6E-07	ND	ND	ND	ND	NA	NA
Naphthalene	5.86E-04	0.003	3.4E-05	6.56E-05	1.84E-04	2E-06	0.06	9%	20%
Tetrachloroethene	1.15E-03	0.27	5.9E-06	1.29E-04	3.62E-04	8E-07	0.001	3%	0.4%
Toluene	2.77E-02	5	NA	NA	8.69E-03	NA	0.002	NA	0.6%
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	NA	NA
trans-1,3-Dichloropropene	ND	0.02	4.0E-06	ND	ND	ND	ND	NA	NA
Trichloroethene	ND	NA	2.0E-06	ND	ND	ND	ND	NA	NA
Vinyl chloride	ND	0.1	4.4E-06	ND	ND	ND	ND	NA	NA
Xylenes	1.92E-02	0.1	NA	NA	6.02E-03	NA	0.06	NA	20%
Total						2E-05	0.3	100%	100%

$$ADE = \frac{EPC_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{ADE}{RfC}$$

$$Risk = ADE \times URF \times CF$$

Notes:

- (a) EPC calculated as average of detected concentrations and one-half indoor air detection limit for non-detects.
- EPC - exposure point concentration
- RfC - reference concentration
- URF - unit risk factor
- ADE-c - average daily exposure (cancer)
- ADE-nc - average daily exposure (noncancer)
- HI - noncancer hazard index
- ug/mg3 - microgram per cubic milligram
- mg/m3 - milligram per cubic meter
- ND - Not detected
- NA - Not available

Table 6. Estimated Risks to a Current Child from Long Term Exposure to Volatile Constituents in Indoor Air via Inhalation

Parameter	Definition	Units	Value
ET	Indoor Air Exposure Time	hours/day	11
EF	Indoor Air Exposure Frequency	days/yr	250
ED	Indoor Air Exposure Duration	years	7
ATc	Indoor Air Averaging Time - Cancer	hours	613200
ATn	Indoor Air Averaging Time - Non-Cancer	hours	61320
CF	Conversion Factor	ug/mg	1000

Compound	EPC (a) Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	ADE-nc mg/m3	Cancer Risk (unitless)	HI Indoor Air (unitless)	% of Total Cancer (unitless)	% of Total Noncancer (unitless)
1,1,1-Trichloroethane	8.18E-05	5	NA	NA	2.57E-05	NA	0.00001	NA	0.00%
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	NA	NA
1,1-Dichloroethane	ND	NA	0.0000016	ND	ND	ND	ND	NA	NA
1,1-Dichloroethene	ND	0.2	NA	ND	ND	ND	ND	NA	NA
1,2,4-Trimethylbenzene	2.44E-03	0.007	NA	NA	7.64E-04	NA	0.1	NA	36%
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	NA	NA
1,2-Dichloroethane	2.39E-04	2.4	0.000026	7.50E-06	7.50E-05	2E-07	0.00003	3%	0.01%
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	NA	NA
1,3-Butadiene	8.47E-05	0.002	0.00003	2.66E-06	2.66E-05	8E-08	0.01	1%	4%
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	NA	NA
1,4-Dichlorobenzene	1.75E-04	0.8	0.000011	5.49E-06	5.49E-05	6E-08	0.0001	1%	0.02%
Benzene	3.14E-03	0.03	0.0000078	9.85E-05	9.85E-04	8E-07	0.03	12%	11%
Bromodichloromethane	3.17E-04	NA	0.000037	9.96E-06	NA	4E-07	NA	6%	NA
Bromoform	ND	NA	0.0000011	ND	ND	ND	ND	NA	NA
Carbon tetrachloride	6.84E-04	0.1	0.000006	2.15E-05	2.15E-04	1E-07	0.002	2%	1%
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	NA	NA
Chloroform	5.27E-03	0.098	0.000023	1.65E-04	1.65E-03	4E-06	0.02	58%	6%
cis-1,2-Dichloroethene	ND	0.035	NA	ND	ND	ND	ND	NA	NA
Ethylbenzene	3.55E-03	1	0.0000025	1.12E-04	1.12E-03	3E-07	0.001	4%	0.4%
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	NA	NA
Methylene chloride	4.28E-03	1	0.00000047	1.34E-04	1.34E-03	6E-08	0.001	1%	0.4%
Methyl tert butyl ether	ND	3	0.00000026	ND	ND	ND	ND	NA	NA
Naphthalene	5.86E-04	0.003	0.000034	1.84E-05	1.84E-04	6E-07	0.06	9%	20%
Tetrachloroethene	1.15E-03	0.27	0.0000059	3.62E-05	3.62E-04	2E-07	0.001	3%	0.4%
Toluene	2.77E-02	5	NA	NA	8.69E-03	NA	0.002	NA	1%
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	NA	NA
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	NA	NA
Trichloroethene	ND	NA	0.000002	ND	ND	ND	ND	NA	NA
Vinyl chloride	ND	0.1	0.0000044	ND	ND	ND	ND	NA	NA
Xylenes	1.92E-02	0.1	NA	NA	6.02E-03	NA	0.06	NA	20%
Total						7E-06	0.3	100%	100%

$$ADE = \frac{EPC_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{ADE}{RfC}$$

$$Risk = ADE \times URF \times CF$$

Notes:
 (a) EPC calculated as average of detected concentrations and one-half indoor air detection limit for non-detects.
 EPC - exposure point concentration
 RfC - reference concentration
 URF - unit risk factor
 ADE-c - average daily exposure (cancer)
 ADE-nc - average daily exposure (noncancer)
 HI - noncancer hazard index
 ug/mg3 - microgram per cubic milligram
 mg/m3 - milligram per cubic meter
 ND - Not detected
 NA - Not available

Table 7. Estimated Risks to a Hypothetical Resident from Long Term Exposure to Volatile Constituents in Indoor Air via Inhalation

Parameter	Definition	Units	Value
ET	Indoor Air Exposure Time	hours/day	24
EF	Indoor Air Exposure Frequency	days/yr	350
ED	Indoor Air Exposure Duration	years	30
ATc	Indoor Air Averaging Time - Cancer	hours	613200
ATn	Indoor Air Averaging Time - Non-Cancer	hours	262800
CF	Conversion Factor	ug/mg	1000

Compound	EPC (a) Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	ADE-nc mg/m3	Cancer Risk (unitless)	HI Indoor Air (unitless)	% of Total Cancer (unitless)	% of Total Noncancer (unitless)
1,1,1-Trichloroethane	8.18E-05	5	NA	NA	7.84E-05	NA	0.00002	NA	0.00%
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	NA	NA
1,1-Dichloroethane	ND	NA	0.0000016	ND	ND	ND	ND	NA	NA
1,1-Dichloroethene	ND	0.2	NA	ND	ND	ND	ND	NA	NA
1,2,4-Trimethylbenzene	2.44E-03	0.007	NA	NA	2.33E-03	NA	0.3	NA	36%
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	NA	NA
1,2-Dichloroethane	2.39E-04	2.4	0.000026	9.82E-05	2.29E-04	3E-06	0.0001	3%	0.01%
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	NA	NA
1,3-Butadiene	8.47E-05	0.002	0.00003	3.48E-05	8.12E-05	1E-06	0.04	1%	4%
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	NA	NA
1,4-Dichlorobenzene	1.75E-04	0.8	0.000011	7.19E-05	1.68E-04	8E-07	0.0002	1%	0.02%
Benzene	3.14E-03	0.03	0.000078	1.29E-03	3.01E-03	1E-05	0.1	12%	11%
Bromodichloromethane	3.17E-04	NA	0.000037	1.30E-04	NA	5E-06	NA	6%	NA
Bromoform	ND	NA	0.0000011	ND	ND	ND	ND	NA	NA
Carbon tetrachloride	6.84E-04	0.1	0.000006	2.81E-04	6.56E-04	2E-06	0.01	2%	1%
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	NA	NA
Chloroform	5.27E-03	0.098	0.000023	2.16E-03	5.05E-03	5E-05	0.05	58%	6%
cis-1,2-Dichloroethene	ND	0.035	NA	ND	ND	ND	ND	NA	NA
Ethylbenzene	3.55E-03	1	0.0000025	1.46E-03	3.41E-03	4E-06	0.003	4%	0.4%
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	NA	NA
Methylene chloride	4.28E-03	1	0.00000047	1.76E-03	4.10E-03	8E-07	0.004	1%	0.4%
Methyl tert butyl ether	ND	3	0.00000026	ND	ND	ND	ND	NA	NA
Naphthalene	5.86E-04	0.003	0.000034	2.41E-04	5.61E-04	8E-06	0.2	9%	20%
Tetrachloroethene	1.15E-03	0.27	0.0000059	4.74E-04	1.11E-03	3E-06	0.004	3%	0.4%
Toluene	2.77E-02	5	NA	NA	2.65E-02	NA	0.005	NA	1%
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	NA	NA
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	NA	NA
Trichloroethene	ND	NA	0.000002	ND	ND	ND	ND	NA	NA
Vinyl chloride	ND	0.1	0.0000044	ND	ND	ND	ND	NA	NA
Xylenes	1.92E-02	0.1	NA	NA	1.84E-02	NA	0.2	NA	20%
Total						9E-05	0.9	100%	100%

$$ADE = \frac{EPC_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{ADE}{RfC}$$

$$Risk = ADE \times URF \times CF$$

Notes:

- (a) EPC calculated as average of detected concentrations and one-half indoor air detection limit for non-detects.
- EPC - exposure point concentration
- RfC - reference concentration
- URF - unit risk factor
- ADE-c - average daily exposure (cancer)
- ADE-nc - average daily exposure (noncancer)
- HI - noncancer hazard index
- ug/mg3 - microgram per cubic milligram
- mg/m3 - milligram per cubic meter
- ND - Not detected
- NA - Not available

Table 8. Estimated Risks to Current Children and Workers from Short Term Exposure to Volatile Constituents in Indoor Air via Inhalation - Combined Results

Parameter	Definition	Units	Value
ET	Indoor Air Exposure Time	hours/day	11
EF	Indoor Air Exposure Frequency	days/yr	250
ED	Indoor Air Exposure Duration	years	5
ATc	Indoor Air Averaging Time - Cancer	hours	613200
ATn	Indoor Air Averaging Time - Non-Cancer	hours	43800
CF	Conversion Factor	ug/mg	1000

Compound	EPC (a) Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	ADE-nc mg/m3	Cancer Risk Indoor Air (unitless)	HI Indoor Air (unitless)	% of Total Cancer Risk (unitless)	% of Total Noncancer HI (unitless)
1,1,1-Trichloroethane	6.81E-05	5	NA	NA	2.14E-05	NA	0.00000	NA	0%
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	NA	NA
1,1-Dichloroethane	ND	NA	0.0000016	ND	ND	ND	ND	NA	NA
1,1-Dichloroethene	ND	0.2	NA	ND	ND	ND	ND	NA	NA
1,2,4-Trimethylbenzene	1.36E-03	0.007	NA	NA	4.28E-04	NA	0.06	NA	33%
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	NA	NA
1,2-Dichloroethane	1.88E-04	2.4	0.000026	4.22E-06	5.90E-05	1E-07	0.00002	3%	0.01%
1,2-Dichloropropane	ND	0.004	0.0001	ND	ND	ND	ND	NA	NA
1,3-Butadiene	7.40E-05	0.002	0.00003	1.66E-06	2.32E-05	5E-08	0.01	1%	6%
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	NA	NA
1,4-Dichlorobenzene	1.18E-04	0.8	0.000011	2.63E-06	3.69E-05	3E-08	0.0000	0.8%	0.02%
Benzene	1.93E-03	0.03	0.0000078	4.34E-05	6.07E-04	3E-07	0.02	9%	11%
Bromodichloromethane	1.93E-04	NA	0.000037	4.33E-06	NA	2E-07	NA	4%	NA
Bromoform	ND	NA	0.0000011	ND	ND	ND	ND	NA	NA
Carbon tetrachloride	1.02E-03	0.1	0.000006	2.29E-05	3.21E-04	1E-07	0.003	4%	2%
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	NA	NA
Chloroform	4.41E-03	0.098	0.000023	9.88E-05	1.38E-03	2E-06	0.01	62%	8%
cis-1,2-Dichloroethene	ND	0.035	NA	ND	ND	ND	ND	NA	NA
Ethylbenzene	2.03E-03	1	0.0000025	4.55E-05	6.37E-04	1E-07	0.0006	3%	0.3%
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	NA	NA
Methylene chloride	2.76E-03	1	0.00000047	6.20E-05	8.67E-04	3E-08	0.0009	0.8%	0.5%
Methyl tert butyl ether	ND	3	0.00000026	ND	ND	ND	ND	NA	NA
Naphthalene	3.58E-04	0.003	0.000034	8.03E-06	1.12E-04	3E-07	0.04	7%	20%
Tetrachloroethene	1.13E-03	0.27	0.0000059	2.54E-05	3.56E-04	1E-07	0.001	4%	0.7%
Toluene	1.60E-02	5	NA	NA	5.04E-03	NA	0.001	NA	0.5%
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	NA	NA
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	NA	NA
Trichloroethene	ND	NA	0.000002	ND	ND	ND	ND	NA	NA
Vinyl chloride	ND	0.1	0.0000044	ND	ND	ND	ND	NA	NA
Xylenes	1.09E-02	0.1	NA	NA	3.41E-03	NA	0.03	NA	18%
Total						4E-06	0.2	100%	100%

$$ADE = \frac{EPC_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{ADE}{RfC}$$

$$Risk = ADE \times URF \times CF$$

Notes:

- (a) EPC calculated as average of detected concentrations and one-half indoor air detection limit for non-detects.
- EC = exposure concentration
- EPC = exposure point concentration
- RfC - reference concentration
- URF - unit risk factor
- ADE-c - average daily exposure (cancer)
- ADE-nc - average daily exposure (noncancer)
- HI - noncancer hazard index
- ug/mg3 - microgram per cubic milligram
- NA - Not available
- ND - Not detected
- mg/m3 - milligram per cubic meter

Table 9. Estimated Risks to a Current Worker from Long Term Exposure to Volatile Constituents in Indoor Air via Inhalation - Combined Results

Parameter	Definition	Units	Value
ET	Indoor Air Exposure Time	hours/day	11
EF	Indoor Air Exposure Frequency	days/yr	250
ED	Indoor Air Exposure Duration	years	25
ATc	Indoor Air Averaging Time - Cancer	hours	613200
ATn	Indoor Air Averaging Time - Non-Cancer	hours	219000
CF	Conversion Factor	ug/mg	1000

Compound	EPC (a) Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	ADE-nc mg/m3	Cancer Risk Indoor Air (unitless)	HI Indoor Air (unitless)	% of Total Cancer Risk (unitless)	% of Total Noncancer HI (unitless)
1,1,1-Trichloroethane	6.81E-05	5	NA	NA	2.14E-05	NA	0.000004	NA	0.002%
1,1,2-Trichloroethane	ND	NA	1.6E-05	ND	ND	ND	ND	NA	NA
1,1-Dichloroethane	ND	NA	1.6E-06	ND	ND	ND	ND	NA	NA
1,1-Dichloroethene	ND	0.2	NA	ND	ND	ND	ND	NA	NA
1,2,4-Trimethylbenzene	1.36E-03	0.007	NA	NA	4.28E-04	NA	0.06	NA	33%
1,2-Dibromoethane	ND	0.009	6.0E-04	ND	ND	ND	ND	NA	NA
1,2-Dichloroethane	1.88E-04	2.4	2.6E-05	2.11E-05	5.90E-05	5E-07	0.00002	3%	0.01%
1,2-Dichloropropane	ND	0.004	1.0E-05	ND	ND	ND	ND	NA	NA
1,3-Butadiene	7.40E-05	0.002	3.0E-05	8.30E-06	2.32E-05	2E-07	0.01	1%	6%
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	NA	NA
1,4-Dichlorobenzene	1.18E-04	0.8	1.1E-05	1.32E-05	3.69E-05	1E-07	0.0000	0.8%	0.02%
Benzene	1.93E-03	0.03	7.8E-06	2.17E-04	6.07E-04	2E-06	0.02	9%	11%
Bromodichloromethane	1.93E-04	NA	3.7E-05	2.17E-05	NA	8E-07	NA	4%	NA
Bromoform	ND	NA	1.1E-06	ND	ND	ND	ND	NA	NA
Carbon tetrachloride	1.02E-03	0.1	6.0E-06	1.15E-04	3.21E-04	7E-07	0.003	4%	2%
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	NA	NA
Chloroform	4.41E-03	0.098	2.3E-05	4.94E-04	1.38E-03	1E-05	0.01	62%	8%
cis-1,2-Dichloroethene	ND	0.035	NA	ND	ND	ND	ND	NA	NA
Ethylbenzene	2.03E-03	1	2.5E-06	2.28E-04	6.37E-04	6E-07	0.0006	3%	0.3%
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	NA	NA
Methylene chloride	2.76E-03	1	4.7E-07	3.10E-04	8.67E-04	1E-07	0.0009	0.8%	0.5%
Methyl tert butyl ether	ND	3	2.6E-07	ND	ND	ND	ND	NA	NA
Naphthalene	3.58E-04	0.003	3.4E-05	4.02E-05	1.12E-04	1E-06	0.04	7%	20%
Tetrachloroethene	1.13E-03	0.27	5.9E-06	1.27E-04	3.56E-04	7E-07	0.001	4%	0.7%
Toluene	1.60E-02	5	NA	NA	5.04E-03	NA	0.001	NA	0.5%
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	NA	NA
trans-1,3-Dichloropropene	ND	0.02	4.0E-06	ND	ND	ND	ND	NA	NA
Trichloroethene	ND	NA	2.0E-06	ND	ND	ND	ND	NA	NA
Vinyl chloride	ND	0.1	4.4E-06	ND	ND	ND	ND	NA	NA
Xylenes	1.09E-02	0.1	NA	NA	3.41E-03	NA	0.03	NA	18%
Total						2E-05	0.2	100%	100%

$$ADE = \frac{EPC_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{ADE}{RfC}$$

$$Risk = ADE \times URF \times CF$$

Notes:

- (a) EPC calculated as average of detected concentrations and one-half indoor air detection limit for non-detects.
- EPC - exposure point concentration
- RfC - reference concentration
- URF - unit risk factor
- ADE-c - average daily exposure (cancer)
- ADE-nc - average daily exposure (noncancer)
- HI - noncancer hazard index
- ug/mg3 - microgram per cubic milligram
- mg/m3 - milligram per cubic meter
- ND - Not detected
- NA - Not available

Table 10. Estimated Risks to a Current Child from Long Term Exposure to Volatile Constituents in Indoor Air via Inhalation - Combined Results

Parameter	Definition	Units	Value
ET	Indoor Air Exposure Time	hours/day	11
EF	Indoor Air Exposure Frequency	days/yr	250
ED	Indoor Air Exposure Duration	years	7
ATc	Indoor Air Averaging Time - Cancer	hours	613200
ATn	Indoor Air Averaging Time - Non-Cancer	hours	61320
CF	Conversion Factor	ug/mg	1000

Compound	EPC (a) Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	ADE-nc mg/m3	Cancer Risk (unitless)	HI Indoor Air (unitless)	% of Total Cancer (unitless)	% of Total Noncancer (unitless)
1,1,1-Trichloroethane	6.81E-05	5	NA	NA	2.14E-05	NA	0.000004	NA	0.002%
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	NA	NA
1,1-Dichloroethane	ND	NA	0.0000016	ND	ND	ND	ND	NA	NA
1,1-Dichloroethene	ND	0.2	NA	ND	ND	ND	ND	NA	NA
1,2,4-Trimethylbenzene	1.36E-03	0.007	NA	NA	4.28E-04	NA	0.06	NA	33%
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	NA	NA
1,2-Dichloroethane	1.88E-04	2.4	0.000026	5.90E-06	5.90E-05	2E-07	0.000002	3%	0.01%
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	NA	NA
1,3-Butadiene	7.40E-05	0.002	0.00003	2.32E-06	2.32E-05	7E-08	0.01	1%	6%
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	NA	NA
1,4-Dichlorobenzene	1.18E-04	0.8	0.000011	3.69E-06	3.69E-05	4E-08	0.0000	1%	0.02%
Benzene	1.93E-03	0.03	0.0000078	6.07E-05	6.07E-04	5E-07	0.02	9%	11%
Bromodichloromethane	1.93E-04	NA	0.000037	6.07E-06	NA	2E-07	NA	4%	NA
Bromoform	ND	NA	0.0000011	ND	ND	ND	ND	NA	NA
Carbon tetrachloride	1.02E-03	0.1	0.000006	3.21E-05	3.21E-04	2E-07	0.003	4%	2%
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	NA	NA
Chloroform	4.41E-03	0.098	0.000023	1.38E-04	1.38E-03	3E-06	0.01	62%	8%
cis-1,2-Dichloroethene	ND	0.035	NA	ND	ND	ND	ND	NA	NA
Ethylbenzene	2.03E-03	1	0.0000025	6.37E-05	6.37E-04	2E-07	0.0006	3%	0.3%
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	NA	NA
Methylene chloride	2.76E-03	1	0.00000047	8.67E-05	8.67E-04	4E-08	0.0009	1%	0.5%
Methyl tert butyl ether	ND	3	0.00000026	ND	ND	ND	ND	NA	NA
Naphthalene	3.58E-04	0.003	0.000034	1.12E-05	1.12E-04	4E-07	0.04	7%	20%
Tetrachloroethene	1.13E-03	0.27	0.0000059	3.56E-05	3.56E-04	2E-07	0.001	4%	0.7%
Toluene	1.60E-02	5	NA	NA	5.04E-03	NA	0.001	NA	0.5%
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	NA	NA
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	NA	NA
Trichloroethene	ND	NA	0.000002	ND	ND	ND	ND	NA	NA
Vinyl chloride	ND	0.1	0.0000044	ND	ND	ND	ND	NA	NA
Xylenes	1.09E-02	0.1	NA	NA	3.41E-03	NA	0.03	NA	18%
Total						5E-06	0.2	100%	100%

$$ADE = \frac{EPC_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{ADE}{RfC}$$

$$Risk = ADE \times URF \times CF$$

Notes:
 (a) EPC calculated as average of detected concentrations and one-half indoor air detection limit for non-detects.
 EPC - exposure point concentration
 RfC - reference concentration
 URF - unit risk factor
 ADE-c - average daily exposure (cancer)
 ADE-nc - average daily exposure (noncancer)
 HI - noncancer hazard index
 ug/mg3 - microgram per cubic milligram
 mg/m3 - milligram per cubic meter
 ND - Not detected
 NA - Not available

Table 11. Estimated Risks to a Hypothetical Resident from Long Term Exposure to Volatile Constituents in Indoor Air via Inhalation - Combined Results

Parameter	Definition	Units	Value
ET	Indoor Air Exposure Time	hours/day	24
EF	Indoor Air Exposure Frequency	days/yr	350
ED	Indoor Air Exposure Duration	years	30
ATc	Indoor Air Averaging Time - Cancer	hours	613200
ATn	Indoor Air Averaging Time - Non-Cancer	hours	262800
CF	Conversion Factor	ug/mg	1000

Compound	EPC (a) Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	ADE-nc mg/m3	Cancer Risk (unitless)	HI Indoor Air (unitless)	% of Total Cancer (unitless)	% of Total Noncancer (unitless)
1,1,1-Trichloroethane	6.81E-05	5	NA	NA	6.53E-05	NA	0.00001	NA	0.002%
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	NA	NA
1,1-Dichloroethane	ND	NA	0.0000016	ND	ND	ND	ND	NA	NA
1,1-Dichloroethene	ND	0.2	NA	ND	ND	ND	ND	NA	NA
1,2,4-Trimethylbenzene	1.36E-03	0.007	NA	NA	1.31E-03	NA	0.2	NA	33%
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	NA	NA
1,2-Dichloroethane	1.88E-04	2.4	0.000026	7.73E-05	1.80E-04	2E-06	0.00008	3%	0.01%
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	NA	NA
1,3-Butadiene	7.40E-05	0.002	0.00003	3.04E-05	7.10E-05	9E-07	0.04	1%	6%
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	NA	NA
1,4-Dichlorobenzene	1.18E-04	0.8	0.000011	4.83E-05	1.13E-04	5E-07	0.0001	0.8%	0.02%
Benzene	1.93E-03	0.03	0.000078	7.95E-04	1.85E-03	6E-06	0.06	9%	11%
Bromodichloromethane	1.93E-04	NA	0.000037	7.94E-05	NA	3E-06	NA	4%	NA
Bromoform	ND	NA	0.0000011	ND	ND	ND	ND	NA	NA
Carbon tetrachloride	1.02E-03	0.1	0.000006	4.20E-04	9.81E-04	3E-06	0.01	4%	2%
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	NA	NA
Chloroform	4.41E-03	0.098	0.000023	1.81E-03	4.23E-03	4E-05	0.04	62%	8%
cis-1,2-Dichloroethene	ND	0.035	NA	ND	ND	ND	ND	NA	NA
Ethylbenzene	2.03E-03	1	0.0000025	8.34E-04	1.95E-03	2E-06	0.002	3%	0.3%
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	NA	NA
Methylene chloride	2.76E-03	1	0.00000047	1.14E-03	2.65E-03	5E-07	0.003	0.8%	0.5%
Methyl tert butyl ether	ND	3	0.00000026	ND	ND	ND	ND	NA	NA
Naphthalene	3.58E-04	0.003	0.000034	1.47E-04	3.44E-04	5E-06	0.1	7%	20%
Tetrachloroethene	1.13E-03	0.27	0.0000059	4.66E-04	1.09E-03	3E-06	0.004	4%	0.7%
Toluene	1.60E-02	5	NA	NA	1.54E-02	NA	0.003	NA	0.5%
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	NA	NA
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	NA	NA
Trichloroethene	ND	NA	0.000002	ND	ND	ND	ND	NA	NA
Vinyl chloride	ND	0.1	0.0000044	ND	ND	ND	ND	NA	NA
Xylenes	1.09E-02	0.1	NA	NA	1.04E-02	NA	0.1	NA	18%
Total						7E-05	0.6	100%	100%

$$ADE = \frac{EPC_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{ADE}{RfC}$$

$$Risk = ADE \times URF \times CF$$

Notes:

- (a) EPC calculated as average of detected concentrations and one-half indoor air detection limit for non-detects.
- EPC - exposure point concentration
- RfC - reference concentration
- URF - unit risk factor
- ADE-c - average daily exposure (cancer)
- ADE-nc - average daily exposure (noncancer)
- HI - noncancer hazard index
- ug/mg3 - microgram per cubic milligram
- mg/m3 - milligram per cubic meter
- ND - Not detected
- NA - Not available



Attachment A

Risk Tables

Table
 Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air
 UniFirst Corporation
 Child & Worker - Short Term
 Indoor Air
 Volatilization from Indoor Air
 0
 Sample Location IA-01

Receptor:	Child & Worker - Short Term	▼
Medium of Origin:	Indoor Air	▼
Exposure Medium:	Indoor Air	▼
Exposure Area:		▼
Depth:	NA	▼
Duration:		▼

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hours/day	11	
EF	Indoor Air Exposure Frequency	days/yr	250	
ED	Indoor Air Exposure Duration	years	5	
ATc	Indoor Air Averaging Time - Cancer	hours	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hours	43800	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC		URF 1/(ug/m3)	ADE-c mg/m3	Risk _{inh}	ADE-nc mg/m3	H _{linh}	Risk (Indoor Air)	HI (Indoor Air)
	Indoor Air (mg/m3)	RfC (mg/m3)							
1,1,1-Trichloroethane	1.09E-04	5	NA	NA	NA	3.42E-05	0.00001	NA	0.00001
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	ND	NA	0.0000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,2,4-Trimethylbenzene	2.13E-03	0.007	NA	NA	NA	6.69E-04	0.1	NA	0.1
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	3.08E-04	2.4	0.000026	6.91E-06	2E-07	9.67E-05	0.00004	2E-07	0.00004
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	7.70E-05	0.002	0.00003	1.73E-06	5E-08	2.42E-05	0.01	5E-08	0.01
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	1.80E-04	0.8	0.000011	4.04E-06	4E-08	5.65E-05	0.0001	4E-08	0.0001
Benzene	3.18E-03	0.03	0.0000078	7.13E-05	6E-07	9.98E-04	0.03	6E-07	0.03
Bromodichloromethane	3.15E-04	NA	0.000037	7.06E-06	3E-07	NA	NA	3E-07	NA
Bromoform	ND	NA	0.0000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	7.04E-04	0.1	0.000006	1.58E-05	9E-08	2.21E-04	0.002	9E-08	0.002
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	5.27E-03	0.098	0.000023	1.18E-04	3E-06	1.65E-03	0.02	3E-06	0.02
cis-1,2-Dichloroethene	ND	0.035	NA	ND	ND	ND	ND	ND	ND
Ethylbenzene	3.47E-03	1	0.0000025	7.78E-05	2E-07	1.09E-03	0.001	2E-07	0.001
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Methylene chloride	6.81E-03	1	0.00000047	1.53E-04	7E-08	2.14E-03	0.002	7E-08	0.002
Methyl tert butyl ether	ND	3	0.00000026	ND	ND	ND	ND	ND	ND
Naphthalene	6.03E-04	0.003	0.000034	1.35E-05	5E-07	1.89E-04	0.06	5E-07	0.06
Tetrachloroethene	1.09E-03	0.27	0.0000059	2.44E-05	1E-07	3.42E-04	0.001	1E-07	0.001
Toluene	2.79E-02	5	NA	NA	NA	8.76E-03	0.002	NA	0.002
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	ND	NA	0.000002	ND	ND	ND	ND	ND	ND
Vinyl chloride	ND	0.1	0.0000044	ND	ND	ND	ND	ND	ND
Xylenes	1.88E-02	0.1	NA	NA	NA	5.90E-03	0.06	NA	0.06
Total					5E-06		0.3	5E-06	0.3

NA - Not available
 NC - Not calculated
 ND - Not detected

Table
 Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air
 UniFirst Corporation
 Worker - Long Term
 Indoor Air
 Volatilization from Indoor Air
 0
 Sample Location IA-01

Receptor:	Worker - Long Term	▼
Medium of Origin:	Indoor Air	▼
Exposure Medium:	Indoor Air	▼
Exposure Area:		▼
Depth:	NA	▼
Duration:		▼

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hours/day	11	
EF	Indoor Air Exposure Frequency	days/yr	250	
ED	Indoor Air Exposure Duration	years	25	
ATc	Indoor Air Averaging Time - Cancer	hours	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hours	219000	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC							Risk (Indoor Air)	HI (Indoor Air)
	Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh		
1,1,1-Trichloroethane	1.09E-04	5	NA	NA	NA	3.42E-05	0.00001	NA	0.00001
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	ND	NA	0.0000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,2,4-Trimethylbenzene	2.13E-03	0.007	NA	NA	NA	6.69E-04	0.1	NA	0.1
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	3.08E-04	2.4	0.000026	3.45E-05	9E-07	9.67E-05	0.00004	9E-07	0.00004
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	7.70E-05	0.002	0.00003	8.63E-06	3E-07	2.42E-05	0.01	3E-07	0.01
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	1.80E-04	0.8	0.000011	2.02E-05	2E-07	5.65E-05	0.00007	2E-07	0.00007
Benzene	3.18E-03	0.03	0.0000078	3.57E-04	3E-06	9.98E-04	0.03	3E-06	0.03
Bromodichloromethane	3.15E-04	NA	0.000037	3.53E-05	1E-06	NA	NA	1E-06	NA
Bromoform	ND	NA	0.0000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	7.04E-04	0.1	0.000006	7.89E-05	5E-07	2.21E-04	0.002	5E-07	0.002
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	5.27E-03	0.098	0.000023	5.91E-04	1E-05	1.65E-03	0.02	1E-05	0.02
cis-1,2-Dichloroethene	ND	0.035	NA	ND	ND	ND	ND	ND	ND
Ethylbenzene	3.47E-03	1	0.0000025	3.89E-04	1E-06	1.09E-03	0.001	1E-06	0.001
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Methylene chloride	6.81E-03	1	0.00000047	7.64E-04	4E-07	2.14E-03	0.002	4E-07	0.002
Methyl tert butyl ether	ND	3	0.00000026	ND	ND	ND	ND	ND	ND
Naphthalene	6.03E-04	0.003	0.000034	6.76E-05	2E-06	1.89E-04	0.06	2E-06	0.06
Tetrachloroethene	1.09E-03	0.27	0.0000059	1.22E-04	7E-07	3.42E-04	0.001	7E-07	0.001
Toluene	2.79E-02	5	NA	NA	NA	8.76E-03	0.002	NA	0.002
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	ND	NA	0.000002	ND	ND	ND	ND	ND	ND
Vinyl chloride	ND	0.1	0.0000044	ND	ND	ND	ND	ND	ND
Xylenes	1.88E-02	0.1	NA	NA	NA	5.90E-03	0.06	NA	0.06
Total					2E-05		0.3	2E-05	0.3

NA - Not available
 NC - Not calculated
 ND - Not detected

Table
 Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air
 UniFirst Corporation
 Child - Long Term
 Indoor Air
 Volatilization from Indoor Air
 0
 Sample Location IA-01

Receptor:	Child - Long Term	▼
Medium of Origin:	Indoor Air	▼
Exposure Medium:	Indoor Air	▼
Exposure Area:		▼
Depth:	NA	▼
Duration:		▼

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hours/day	11	
EF	Indoor Air Exposure Frequency	days/yr	250	
ED	Indoor Air Exposure Duration	years	7	
ATc	Indoor Air Averaging Time - Cancer	hours	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hours	61320	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC							Risk (Indoor Air)	HI (Indoor Air)
	Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh		
1,1,1-Trichloroethane	1.09E-04	5	NA	NA	NA	3.42E-05	0.00001	NA	0.00001
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	ND	NA	0.0000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,2,4-Trimethylbenzene	2.13E-03	0.007	NA	NA	NA	6.69E-04	0.1	NA	0.1
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	3.08E-04	2.4	0.000026	9.67E-06	3E-07	9.67E-05	0.00004	3E-07	0.00004
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	7.70E-05	0.002	0.00003	2.42E-06	7E-08	2.42E-05	0.01	7E-08	0.01
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	1.80E-04	0.8	0.000011	5.65E-06	6E-08	5.65E-05	0.0001	6E-08	0.0001
Benzene	3.18E-03	0.03	0.0000078	9.98E-05	8E-07	9.98E-04	0.03	8E-07	0.03
Bromodichloromethane	3.15E-04	NA	0.000037	9.89E-06	4E-07	NA	NA	4E-07	NA
Bromoform	ND	NA	0.0000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	7.04E-04	0.1	0.000006	2.21E-05	1E-07	2.21E-04	0.002	1E-07	0.002
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	5.27E-03	0.098	0.000023	1.65E-04	4E-06	1.65E-03	0.02	4E-06	0.02
cis-1,2-Dichloroethene	ND	0.035	NA	ND	ND	ND	ND	ND	ND
Ethylbenzene	3.47E-03	1	0.0000025	1.09E-04	3E-07	1.09E-03	0.001	3E-07	0.001
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Methylene chloride	6.81E-03	1	0.00000047	2.14E-04	1E-07	2.14E-03	0.002	1E-07	0.002
Methyl tert butyl ether	ND	3	0.00000026	ND	ND	ND	ND	ND	ND
Naphthalene	6.03E-04	0.003	0.000034	1.89E-05	6E-07	1.89E-04	0.06	6E-07	0.06
Tetrachloroethene	1.09E-03	0.27	0.0000059	3.42E-05	2E-07	3.42E-04	0.001	2E-07	0.001
Toluene	2.79E-02	5	NA	NA	NA	8.76E-03	0.002	NA	0.002
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	ND	NA	0.000002	ND	ND	ND	ND	ND	ND
Vinyl chloride	ND	0.1	0.0000044	ND	ND	ND	ND	ND	ND
Xylenes	1.88E-02	0.1	NA	NA	NA	5.90E-03	0.06	NA	0.06
Total					7E-06		0.3	7E-06	0.3

NA - Not available
 NC - Not calculated
 ND - Not detected

Table
 Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air
 UniFirst Corporation
 Resident - Long Term
 Indoor Air
 Volatilization from Indoor Air
 0
 Sample Location IA-01

Receptor:	Resident - Long Term	▼
Medium of Origin:	Indoor Air	▼
Exposure Medium:	Indoor Air	▼
Exposure Area:		▼
Depth:	NA	▼
Duration:		▼

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hours/day	24	
EF	Indoor Air Exposure Frequency	days/yr	350	
ED	Indoor Air Exposure Duration	years	30	
ATc	Indoor Air Averaging Time - Cancer	hours	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hours	262800	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC		URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
	Indoor Air (mg/m3)	RfC (mg/m3)							
1,1,1-Trichloroethane	1.09E-04	5	NA	NA	NA	1.05E-04	0.00002	NA	0.00002
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	ND	NA	0.0000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,2,4-Trimethylbenzene	2.13E-03	0.007	NA	NA	NA	2.04E-03	0.3	NA	0.3
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	3.08E-04	2.4	0.000026	1.27E-04	3E-06	2.95E-04	0.0001	3E-06	0.0001
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	7.70E-05	0.002	0.00003	3.16E-05	9E-07	7.38E-05	0.04	9E-07	0.04
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	1.80E-04	0.8	0.000011	7.40E-05	8E-07	1.73E-04	0.0002	8E-07	0.0002
Benzene	3.18E-03	0.03	0.0000078	1.31E-03	1E-05	3.05E-03	0.1	1E-05	0.1
Bromodichloromethane	3.15E-04	NA	0.000037	1.29E-04	5E-06	NA	NA	5E-06	NA
Bromoform	ND	NA	0.0000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	7.04E-04	0.1	0.000006	2.89E-04	2E-06	6.75E-04	0.01	2E-06	0.01
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	5.27E-03	0.098	0.000023	2.17E-03	5E-05	5.05E-03	0.05	5E-05	0.05
cis-1,2-Dichloroethene	ND	0.035	NA	ND	ND	ND	ND	ND	ND
Ethylbenzene	3.47E-03	1	0.0000025	1.43E-03	4E-06	3.33E-03	0.003	4E-06	0.003
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Methylene chloride	6.81E-03	1	0.00000047	2.80E-03	1E-06	6.53E-03	0.007	1E-06	0.007
Methyl tert butyl ether	ND	3	0.00000026	ND	ND	ND	ND	ND	ND
Naphthalene	6.03E-04	0.003	0.000034	2.48E-04	8E-06	5.78E-04	0.2	8E-06	0.2
Tetrachloroethene	1.09E-03	0.27	0.0000059	4.48E-04	3E-06	1.05E-03	0.004	3E-06	0.004
Toluene	2.79E-02	5	NA	NA	NA	2.68E-02	0.005	NA	0.005
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	ND	NA	0.000002	ND	ND	ND	ND	ND	ND
Vinyl chloride	ND	0.1	0.0000044	ND	ND	ND	ND	ND	ND
Xylenes	1.88E-02	0.1	NA	NA	NA	1.80E-02	0.2	NA	0.2
Total					9E-05		0.9	9E-05	0.9

NA - Not available
 NC - Not calculated
 ND - Not detected

Table
 Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air
 UniFirst Corporation
 Child & Worker - Short Term
 Indoor Air
 Volatilization from Indoor Air
 0
 Sample Location IA-02

Receptor:	Child & Worker - Short Term	▼
Medium of Origin:	Indoor Air	▼
Exposure Medium:	Indoor Air	▼
Exposure Area:		▼
Depth:	NA	▼
Duration:		▼

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hours/day	11	
EF	Indoor Air Exposure Frequency	days/yr	250	
ED	Indoor Air Exposure Duration	years	5	
ATc	Indoor Air Averaging Time - Cancer	hours	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hours	43800	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC		URF 1/(ug/m3)	ADE-c mg/m3	Risk _{inh}	ADE-nc mg/m3	H _{linh}	Risk (Indoor Air)	HI (Indoor Air)
	Indoor Air (mg/m3)	RfC (mg/m3)							
1,1,1-Trichloroethane	8.18E-05	5	NA	NA	NA	2.57E-05	0.00001	NA	0.00001
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	ND	NA	0.0000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,2,4-Trimethylbenzene	2.49E-03	0.007	NA	NA	NA	7.80E-04	0.1	NA	0.1
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	4.05E-05	2.4	0.000026	9.08E-07	2E-08	1.27E-05	0.00001	2E-08	0.00001
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	1.00E-04	0.002	0.00003	2.24E-06	7E-08	3.14E-05	0.02	7E-08	0.02
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	1.77E-04	0.8	0.000011	3.97E-06	4E-08	5.56E-05	0.00007	4E-08	0.00007
Benzene	3.17E-03	0.03	0.0000078	7.10E-05	6E-07	9.94E-04	0.03	6E-07	0.03
Bromodichloromethane	3.22E-04	NA	0.000037	7.21E-06	3E-07	NA	NA	3E-07	NA
Bromoform	ND	NA	0.0000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	6.70E-04	0.1	0.000006	1.50E-05	9E-08	2.10E-04	0.002	9E-08	0.002
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	4.96E-03	0.098	0.000023	1.11E-04	3E-06	1.56E-03	0.02	3E-06	0.02
cis-1,2-Dichloroethene	ND	0.035	NA	ND	ND	ND	ND	ND	ND
Ethylbenzene	3.62E-03	1	0.0000025	8.12E-05	2E-07	1.14E-03	0.001	2E-07	0.001
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Methylene chloride	3.13E-03	1	0.00000047	7.02E-05	3E-08	9.83E-04	0.001	3E-08	0.001
Methyl tert butyl ether	ND	3	0.00000026	ND	ND	ND	ND	ND	ND
Naphthalene	5.51E-04	0.003	0.000034	1.23E-05	4E-07	1.73E-04	0.06	4E-07	0.06
Tetrachloroethene	1.18E-03	0.27	0.0000059	2.65E-05	2E-07	3.70E-04	0.001	2E-07	0.001
Toluene	2.81E-02	5	NA	NA	NA	8.82E-03	0.002	NA	0.002
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	ND	NA	0.000002	ND	ND	ND	ND	ND	ND
Vinyl chloride	ND	0.1	0.0000044	ND	ND	ND	ND	ND	ND
Xylenes	1.95E-02	0.1	NA	NA	NA	6.11E-03	0.06	NA	0.06
Total					4E-06		0.3	4E-06	0.3

NA - Not available
 NC - Not calculated
 ND - Not detected

Table
 Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air
 UniFirst Corporation
 Worker - Long Term
 Indoor Air
 Volatilization from Indoor Air
 0
 Sample Location IA-02

Receptor:	Worker - Long Term	▼
Medium of Origin:	Indoor Air	▼
Exposure Medium:	Indoor Air	▼
Exposure Area:		▼
Depth:	NA	▼
Duration:		▼

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hours/day	11	
EF	Indoor Air Exposure Frequency	days/yr	250	
ED	Indoor Air Exposure Duration	years	25	
ATc	Indoor Air Averaging Time - Cancer	hours	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hours	219000	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC		URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
	Indoor Air (mg/m3)	RfC (mg/m3)							
1,1,1-Trichloroethane	8.18E-05	5	NA	NA	NA	2.57E-05	0.00001	NA	0.00001
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	ND	NA	0.0000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,2,4-Trimethylbenzene	2.49E-03	0.007	NA	NA	NA	7.80E-04	0.11	NA	0.1
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	4.05E-05	2.4	0.000026	4.54E-06	1E-07	1.27E-05	0.00001	1E-07	0.00001
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	1.00E-04	0.002	0.00003	1.12E-05	3E-07	3.14E-05	0.02	3E-07	0.02
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	1.77E-04	0.8	0.000011	1.98E-05	2E-07	5.56E-05	0.00007	2E-07	0.00007
Benzene	3.17E-03	0.03	0.0000078	3.55E-04	3E-06	9.94E-04	0.03	3E-06	0.03
Bromodichloromethane	3.22E-04	NA	0.000037	3.60E-05	1E-06	NA	NA	1E-06	NA
Bromoform	ND	NA	0.0000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	6.70E-04	0.1	0.000006	7.51E-05	5E-07	2.10E-04	0.002	5E-07	0.002
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	4.96E-03	0.098	0.000023	5.56E-04	1E-05	1.56E-03	0.02	1E-05	0.02
cis-1,2-Dichloroethene	ND	0.035	NA	ND	ND	ND	ND	ND	ND
Ethylbenzene	3.62E-03	1	0.0000025	4.06E-04	1E-06	1.14E-03	0.001	1E-06	0.001
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Methylene chloride	3.13E-03	1	0.00000047	3.51E-04	2E-07	9.83E-04	0.001	2E-07	0.001
Methyl tert butyl ether	ND	3	0.00000026	ND	ND	ND	ND	ND	ND
Naphthalene	5.51E-04	0.003	0.000034	6.17E-05	2E-06	1.73E-04	0.06	2E-06	0.06
Tetrachloroethene	1.18E-03	0.27	0.0000059	1.32E-04	8E-07	3.70E-04	0.001	8E-07	0.001
Toluene	2.81E-02	5	NA	NA	NA	8.82E-03	0.002	NA	0.002
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	ND	NA	0.000002	ND	ND	ND	ND	ND	ND
Vinyl chloride	ND	0.1	0.0000044	ND	ND	ND	ND	ND	ND
Xylenes	1.95E-02	0.1	NA	NA	NA	6.11E-03	0.06	NA	0.06
Total					2E-05		0.3	2E-05	0.3

NA - Not available
 NC - Not calculated
 ND - Not detected

Table
 Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air
 UniFirst Corporation
 Child - Long Term
 Indoor Air
 Volatilization from Indoor Air
 0
 Sample Location IA-02

Receptor:	Child - Long Term	▼
Medium of Origin:	Indoor Air	▼
Exposure Medium:	Indoor Air	▼
Exposure Area:		▼
Depth:	NA	▼
Duration:		▼

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hours/day	11	
EF	Indoor Air Exposure Frequency	days/yr	250	
ED	Indoor Air Exposure Duration	years	7	
ATc	Indoor Air Averaging Time - Cancer	hours	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hours	61320	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC			ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
	Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)						
1,1,1-Trichloroethane	8.18E-05	5	NA	NA	NA	2.57E-05	0.00001	NA	0.00001
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	ND	NA	0.0000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,2,4-Trimethylbenzene	2.49E-03	0.007	NA	NA	NA	7.80E-04	0.1	NA	0.1
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	4.05E-05	2.4	0.000026	1.27E-06	3E-08	1.27E-05	0.00001	3E-08	0.00001
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	1.00E-04	0.002	0.00003	3.14E-06	9E-08	3.14E-05	0.02	9E-08	0.02
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	1.77E-04	0.8	0.000011	5.56E-06	6E-08	5.56E-05	0.00007	6E-08	0.00007
Benzene	3.17E-03	0.03	0.0000078	9.94E-05	8E-07	9.94E-04	0.03	8E-07	0.03
Bromodichloromethane	3.22E-04	NA	0.000037	1.01E-05	4E-07	NA	NA	4E-07	NA
Bromoform	ND	NA	0.0000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	6.70E-04	0.1	0.000006	2.10E-05	1E-07	2.10E-04	0.002	1E-07	0.002
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	4.96E-03	0.098	0.000023	1.56E-04	4E-06	1.56E-03	0.02	4E-06	0.02
cis-1,2-Dichloroethene	ND	0.035	NA	ND	ND	ND	ND	ND	ND
Ethylbenzene	3.62E-03	1	0.0000025	1.14E-04	3E-07	1.14E-03	0.001	3E-07	0.001
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Methylene chloride	3.13E-03	1	0.00000047	9.83E-05	5E-08	9.83E-04	0.001	5E-08	0.001
Methyl tert butyl ether	ND	3	0.00000026	ND	ND	ND	ND	ND	ND
Naphthalene	5.51E-04	0.003	0.000034	1.73E-05	6E-07	1.73E-04	0.06	6E-07	0.06
Tetrachloroethene	1.18E-03	0.27	0.0000059	3.70E-05	2E-07	3.70E-04	0.001	2E-07	0.001
Toluene	2.81E-02	5	NA	NA	NA	8.82E-03	0.002	NA	0.002
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	ND	NA	0.000002	ND	ND	ND	ND	ND	ND
Vinyl chloride	ND	0.1	0.0000044	ND	ND	ND	ND	ND	ND
Xylenes	1.95E-02	0.1	NA	NA	NA	6.11E-03	0.061	NA	0.061
Total					6E-06		0.3	6E-06	0.3

NA - Not available
 NC - Not calculated
 ND - Not detected

Table
 Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air
 UniFirst Corporation
 Resident - Long Term
 Indoor Air
 Volatilization from Indoor Air
 0
 Sample Location IA-02

Receptor:	Resident - Long Term	▼
Medium of Origin:	Indoor Air	▼
Exposure Medium:	Indoor Air	▼
Exposure Area:		▼
Depth:	NA	▼
Duration:		▼

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hours/day	24	
EF	Indoor Air Exposure Frequency	days/yr	350	
ED	Indoor Air Exposure Duration	years	30	
ATc	Indoor Air Averaging Time - Cancer	hours	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hours	262800	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC			ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
	Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)						
1,1,1-Trichloroethane	8.18E-05	5	NA	NA	NA	7.84E-05	0.00002	NA	0.00002
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	ND	NA	0.0000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,2,4-Trimethylbenzene	2.49E-03	0.007	NA	NA	NA	2.38E-03	0.3	NA	0.3
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	4.05E-05	2.4	0.000026	1.66E-05	4E-07	3.88E-05	0.00002	4E-07	0.00002
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	1.00E-04	0.002	0.00003	4.11E-05	1E-06	9.59E-05	0.05	1E-06	0.05
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	1.77E-04	0.8	0.000011	7.27E-05	8E-07	1.70E-04	0.0002	8E-07	0.0002
Benzene	3.17E-03	0.03	0.0000078	1.30E-03	1E-05	3.03E-03	0.10	1E-05	0.1
Bromodichloromethane	3.22E-04	NA	0.000037	1.32E-04	5E-06	NA	NA	5E-06	NA
Bromoform	ND	NA	0.0000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	6.70E-04	0.1	0.000006	2.75E-04	2E-06	6.42E-04	0.01	2E-06	0.01
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	4.96E-03	0.098	0.000023	2.04E-03	5E-05	4.76E-03	0.05	5E-05	0.05
cis-1,2-Dichloroethene	ND	0.035	NA	ND	ND	ND	ND	ND	ND
Ethylbenzene	3.62E-03	1	0.0000025	1.49E-03	4E-06	3.47E-03	0.003	4E-06	0.003
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Methylene chloride	3.13E-03	1	0.00000047	1.29E-03	6E-07	3.00E-03	0.003	6E-07	0.003
Methyl tert butyl ether	ND	3	0.00000026	ND	ND	ND	ND	ND	ND
Naphthalene	5.51E-04	0.003	0.000034	2.26E-04	8E-06	5.28E-04	0.2	8E-06	0.2
Tetrachloroethene	1.18E-03	0.27	0.0000059	4.85E-04	3E-06	1.13E-03	0.004	3E-06	0.004
Toluene	2.81E-02	5	NA	NA	NA	2.69E-02	0.005	NA	0.005
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	ND	NA	0.000002	ND	ND	ND	ND	ND	ND
Vinyl chloride	ND	0.1	0.0000044	ND	ND	ND	ND	ND	ND
Xylenes	1.95E-02	0.1	NA	NA	NA	1.87E-02	0.2	NA	0.2
Total					8E-05		0.9	8E-05	0.9

NA - Not available
 NC - Not calculated
 ND - Not detected

Table
 Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air
 UniFirst Corporation
 Child & Worker - Short Term
 Indoor Air
 Volatilization from Indoor Air
 0
 Sample Location IA-03

Receptor:	Child & Worker - Short Term	▼
Medium of Origin:	Indoor Air	▼
Exposure Medium:	Indoor Air	▼
Exposure Area:		▼
Depth:	NA	▼
Duration:		▼

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hours/day	11	
EF	Indoor Air Exposure Frequency	days/yr	250	
ED	Indoor Air Exposure Duration	years	5	
ATc	Indoor Air Averaging Time - Cancer	hours	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hours	43800	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC			ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
	Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)						
1,1,1-Trichloroethane	5.45E-05	5	NA	NA	NA	1.71E-05	0.000003	NA	0.000003
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	ND	NA	0.0000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,2,4-Trimethylbenzene	2.69E-03	0.007	NA	NA	NA	8.44E-04	0.1	NA	0.1
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	3.68E-04	2.4	0.000026	8.25E-06	2E-07	1.16E-04	0.00005	2E-07	0.00005
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	7.70E-05	0.002	0.00003	1.73E-06	5E-08	2.42E-05	0.01	5E-08	0.01
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	1.68E-04	0.8	0.000011	3.77E-06	4E-08	5.27E-05	0.00007	4E-08	0.00007
Benzene	3.07E-03	0.03	0.0000078	6.88E-05	5E-07	9.64E-04	0.03	5E-07	0.03
Bromodichloromethane	3.15E-04	NA	0.000037	7.06E-06	3E-07	NA	NA	3E-07	NA
Bromoform	ND	NA	0.0000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	6.79E-04	0.1	0.000006	1.52E-05	9E-08	2.13E-04	0.002	9E-08	0.002
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	5.57E-03	0.098	0.000023	1.25E-04	3E-06	1.75E-03	0.02	3E-06	0.02
cis-1,2-Dichloroethene	ND	0.035	NA	ND	ND	ND	ND	ND	ND
Ethylbenzene	3.57E-03	1	0.0000025	8.01E-05	2E-07	1.12E-03	0.001	2E-07	0.001
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Methylene chloride	2.89E-03	1	0.00000047	6.48E-05	3E-08	9.07E-04	0.0009	3E-08	0.0009
Methyl tert butyl ether	ND	3	0.00000026	ND	ND	ND	ND	ND	ND
Naphthalene	6.03E-04	0.003	0.000034	1.35E-05	5E-07	1.89E-04	0.06	5E-07	0.06
Tetrachloroethene	1.19E-03	0.27	0.0000059	2.67E-05	2E-07	3.74E-04	0.001	2E-07	0.001
Toluene	2.70E-02	5	NA	NA	NA	8.48E-03	0.002	NA	0.002
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	ND	NA	0.000002	ND	ND	ND	ND	ND	ND
Vinyl chloride	ND	0.1	0.0000044	ND	ND	ND	ND	ND	ND
Xylenes	1.93E-02	0.1	NA	NA	NA	6.06E-03	0.06	NA	0.06
Total					5E-06		0.3	5E-06	0.3

NA - Not available
 NC - Not calculated
 ND - Not detected

Table
 Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air
 UniFirst Corporation
 Worker - Long Term
 Indoor Air
 Volatilization from Indoor Air
 0
 Sample Location IA-03

Receptor:	Worker - Long Term	▼
Medium of Origin:	Indoor Air	▼
Exposure Medium:	Indoor Air	▼
Exposure Area:		▼
Depth:	NA	▼
Duration:		▼

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hours/day	11	
EF	Indoor Air Exposure Frequency	days/yr	250	
ED	Indoor Air Exposure Duration	years	25	
ATc	Indoor Air Averaging Time - Cancer	hours	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hours	219000	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC			ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
	Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)						
1,1,1-Trichloroethane	5.45E-05	5	NA	NA	NA	1.71E-05	0.000003	NA	0.000003
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	ND	NA	0.0000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,2,4-Trimethylbenzene	2.69E-03	0.007	NA	NA	NA	8.44E-04	0.1	NA	0.1
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	3.68E-04	2.4	0.000026	4.13E-05	1E-06	1.16E-04	0.00005	1E-06	0.00005
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	7.70E-05	0.002	0.00003	8.63E-06	3E-07	2.42E-05	0.01	3E-07	0.01
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	1.68E-04	0.8	0.000011	1.88E-05	2E-07	5.27E-05	0.00007	2E-07	0.00007
Benzene	3.07E-03	0.03	0.0000078	3.44E-04	3E-06	9.64E-04	0.03	3E-06	0.03
Bromodichloromethane	3.15E-04	NA	0.000037	3.53E-05	1E-06	NA	NA	1E-06	NA
Bromoform	ND	NA	0.0000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	6.79E-04	0.1	0.000006	7.61E-05	5E-07	2.13E-04	0.002	5E-07	0.002
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	5.57E-03	0.098	0.000023	6.24E-04	1E-05	1.75E-03	0.02	1E-05	0.02
cis-1,2-Dichloroethene	ND	0.035	NA	ND	ND	ND	ND	ND	ND
Ethylbenzene	3.57E-03	1	0.0000025	4.00E-04	1E-06	1.12E-03	0.001	1E-06	0.001
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Methylene chloride	2.89E-03	1	0.00000047	3.24E-04	2E-07	9.07E-04	0.0009	2E-07	0.0009
Methyl tert butyl ether	ND	3	0.00000026	ND	ND	ND	ND	ND	ND
Naphthalene	6.03E-04	0.003	0.000034	6.76E-05	2E-06	1.89E-04	0.06	2E-06	0.06
Tetrachloroethene	1.19E-03	0.27	0.0000059	1.33E-04	8E-07	3.74E-04	0.001	8E-07	0.001
Toluene	2.70E-02	5	NA	NA	NA	8.48E-03	0.002	NA	0.002
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	ND	NA	0.000002	ND	ND	ND	ND	ND	ND
Vinyl chloride	ND	0.1	0.0000044	ND	ND	ND	ND	ND	ND
Xylenes	1.93E-02	0.1	NA	NA	NA	6.06E-03	0.06	NA	0.06
Total						2E-05	0.3	2E-05	0.3

NA - Not available
 NC - Not calculated
 ND - Not detected

Table
 Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air
 UniFirst Corporation
 Child - Long Term
 Indoor Air
 Volatilization from Indoor Air
 0
 Sample Location IA-03

Receptor:	Child - Long Term	▼
Medium of Origin:	Indoor Air	▼
Exposure Medium:	Indoor Air	▼
Exposure Area:		▼
Depth:	NA	▼
Duration:		▼

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hours/day	11	
EF	Indoor Air Exposure Frequency	days/yr	250	
ED	Indoor Air Exposure Duration	years	7	
ATc	Indoor Air Averaging Time - Cancer	hours	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hours	61320	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC		URF 1/(ug/m3)	ADE-c mg/m3	Risk _{inh}	ADE-nc mg/m3	H _{linh}	Risk (Indoor Air)	HI (Indoor Air)
	Indoor Air (mg/m3)	RfC (mg/m3)							
1,1,1-Trichloroethane	5.45E-05	5	NA	NA	NA	1.71E-05	0.000003	NA	0.000003
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	ND	NA	0.0000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,2,4-Trimethylbenzene	2.69E-03	0.007	NA	NA	NA	8.44E-04	0.1	NA	0.1
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	3.68E-04	2.4	0.000026	1.16E-05	3E-07	1.16E-04	0.00005	3E-07	0.00005
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	7.70E-05	0.002	0.00003	2.42E-06	7E-08	2.42E-05	0.01	7E-08	0.01
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	1.68E-04	0.8	0.000011	5.27E-06	6E-08	5.27E-05	0.00007	6E-08	0.00007
Benzene	3.07E-03	0.03	0.0000078	9.64E-05	8E-07	9.64E-04	0.03	8E-07	0.03
Bromodichloromethane	3.15E-04	NA	0.000037	9.89E-06	4E-07	NA	NA	4E-07	NA
Bromoform	ND	NA	0.0000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	6.79E-04	0.1	0.000006	2.13E-05	1E-07	2.13E-04	0.002	1E-07	0.002
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	5.57E-03	0.098	0.000023	1.75E-04	4E-06	1.75E-03	0.02	4E-06	0.02
cis-1,2-Dichloroethene	ND	0.035	NA	ND	ND	ND	ND	ND	ND
Ethylbenzene	3.57E-03	1	0.0000025	1.12E-04	3E-07	1.12E-03	0.001	3E-07	0.001
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Methylene chloride	2.89E-03	1	0.00000047	9.07E-05	4E-08	9.07E-04	0.0009	4E-08	0.0009
Methyl tert butyl ether	ND	3	0.00000026	ND	ND	ND	ND	ND	ND
Naphthalene	6.03E-04	0.003	0.000034	1.89E-05	6E-07	1.89E-04	0.06	6E-07	0.06
Tetrachloroethene	1.19E-03	0.27	0.0000059	3.74E-05	2E-07	3.74E-04	0.001	2E-07	0.001
Toluene	2.70E-02	5	NA	NA	NA	8.48E-03	0.002	NA	0.002
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	ND	NA	0.000002	ND	ND	ND	ND	ND	ND
Vinyl chloride	ND	0.1	0.0000044	ND	ND	ND	ND	ND	ND
Xylenes	1.93E-02	0.1	NA	NA	NA	6.06E-03	0.06	NA	0.06
Total					7E-06		0.3	7E-06	0.3

NA - Not available
 NC - Not calculated
 ND - Not detected

Table
 Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air
 UniFirst Corporation
 Resident - Long Term
 Indoor Air
 Volatilization from Indoor Air
 0
 Sample Location IA-03

Receptor:	Resident - Long Term	▼
Medium of Origin:	Indoor Air	▼
Exposure Medium:	Indoor Air	▼
Exposure Area:		▼
Depth:	NA	▼
Duration:		▼

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hours/day	24	
EF	Indoor Air Exposure Frequency	days/yr	350	
ED	Indoor Air Exposure Duration	years	30	
ATc	Indoor Air Averaging Time - Cancer	hours	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hours	262800	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC		URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
	Indoor Air (mg/m3)	RfC (mg/m3)							
1,1,1-Trichloroethane	5.45E-05	5	NA	NA	NA	5.23E-05	0.00001	NA	0.00001
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	ND	NA	0.0000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,2,4-Trimethylbenzene	2.69E-03	0.007	NA	NA	NA	2.58E-03	0.4	NA	0.4
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	3.68E-04	2.4	0.000026	1.51E-04	4E-06	3.53E-04	0.0001	4E-06	0.0001
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	7.70E-05	0.002	0.00003	3.16E-05	9E-07	7.38E-05	0.04	9E-07	0.04
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	1.68E-04	0.8	0.000011	6.90E-05	8E-07	1.61E-04	0.0002	8E-07	0.0002
Benzene	3.07E-03	0.03	0.0000078	1.26E-03	1E-05	2.94E-03	0.1	1E-05	0.1
Bromodichloromethane	3.15E-04	NA	0.000037	1.29E-04	5E-06	NA	NA	5E-06	NA
Bromoform	ND	NA	0.0000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	6.79E-04	0.1	0.000006	2.79E-04	2E-06	6.51E-04	0.01	2E-06	0.01
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	5.57E-03	0.098	0.000023	2.29E-03	5E-05	5.34E-03	0.05	5E-05	0.05
cis-1,2-Dichloroethene	ND	0.035	NA	ND	ND	ND	ND	ND	ND
Ethylbenzene	3.57E-03	1	0.0000025	1.47E-03	4E-06	3.42E-03	0.003	4E-06	0.003
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Methylene chloride	2.89E-03	1	0.00000047	1.19E-03	6E-07	2.77E-03	0.003	6E-07	0.003
Methyl tert butyl ether	ND	3	0.00000026	ND	ND	ND	ND	ND	ND
Naphthalene	6.03E-04	0.003	0.000034	2.48E-04	8E-06	5.78E-04	0.2	8E-06	0.2
Tetrachloroethene	1.19E-03	0.27	0.0000059	4.89E-04	3E-06	1.14E-03	0.004	3E-06	0.004
Toluene	2.70E-02	5	NA	NA	NA	2.59E-02	0.005	NA	0.005
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	ND	NA	0.000002	ND	ND	ND	ND	ND	ND
Vinyl chloride	ND	0.1	0.0000044	ND	ND	ND	ND	ND	ND
Xylenes	1.93E-02	0.1	NA	NA	NA	1.85E-02	0.2	NA	0.2
Total					9E-05		1	9E-05	1

NA - Not available
 NC - Not calculated
 ND - Not detected

Table
 Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air
 UniFirst Corporation
 Child & Worker - Short Term
 Indoor Air
 Volatilization from Indoor Air Combined Results
 0
 Sample Location IA-01

Receptor:	Child & Worker - Short Term	▼
Medium of Origin:	Indoor Air	▼
Exposure Medium:	Indoor Air	▼
Exposure Area:		▼
Depth:	NA	▼
Duration:		▼

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hours/day	11	
EF	Indoor Air Exposure Frequency	days/yr	250	
ED	Indoor Air Exposure Duration	years	5	
ATc	Indoor Air Averaging Time - Cancer	hours	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hours	43800	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC							Risk (Indoor Air)	HI (Indoor Air)
	Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh		
1,1,1-Trichloroethane	8.18E-05	5	NA	NA	NA	2.57E-05	0.00001	NA	0.00001
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	ND	NA	0.0000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,2,4-Trimethylbenzene	1.22E-03	0.007	NA	NA	NA	3.84E-04	0.05	NA	0.05
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	2.17E-04	2.4	0.000026	4.85E-06	1E-07	6.80E-05	0.00003	1E-07	0.00003
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	6.80E-05	0.002	0.00003	1.52E-06	5E-08	2.13E-05	0.01	5E-08	0.01
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	1.20E-04	0.8	0.000011	2.69E-06	3E-08	3.77E-05	0.00005	3E-08	0.00005
Benzene	1.94E-03	0.03	0.0000078	4.34E-05	3E-07	6.08E-04	0.02	3E-07	0.02
Bromodichloromethane	1.91E-04	NA	0.000037	4.28E-06	2E-07	NA	NA	2E-07	NA
Bromoform	ND	NA	0.0000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	1.01E-03	0.1	0.000006	2.27E-05	1E-07	3.18E-04	0.003	1E-07	0.003
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	4.24E-03	0.098	0.000023	9.51E-05	2E-06	1.33E-03	0.01	2E-06	0.01
cis-1,2-Dichloroethene	ND	0.035	NA	ND	ND	ND	ND	ND	ND
Ethylbenzene	1.98E-03	1	0.0000025	4.44E-05	1E-07	6.22E-04	0.0006	1E-07	0.0006
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Methylene chloride	3.84E-03	1	0.00000047	8.61E-05	4E-08	1.21E-03	0.001	4E-08	0.001
Methyl tert butyl ether	ND	3	0.00000026	ND	ND	ND	ND	ND	ND
Naphthalene	3.67E-04	0.003	0.000034	8.23E-06	3E-07	1.15E-04	0.04	3E-07	0.04
Tetrachloroethene	1.04E-03	0.27	0.0000059	2.32E-05	1E-07	3.25E-04	0.001	1E-07	0.001
Toluene	1.58E-02	5	NA	NA	NA	4.95E-03	0.001	NA	0.001
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	ND	NA	0.000002	ND	ND	ND	ND	ND	ND
Vinyl chloride	ND	0.1	0.0000044	ND	ND	ND	ND	ND	ND
Xylenes	1.07E-02	0.1	NA	NA	NA	3.35E-03	0.03	NA	0.03
Total					4E-06		0.2	4E-06	0.2

NA - Not available
 NC - Not calculated
 ND - Not detected

Table
 Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air
 UniFirst Corporation
 Worker - Long Term
 Indoor Air
 Volatilization from Indoor Air Combined Results
 0
 Sample Location IA-01

Receptor:	Worker - Long Term	▼
Medium of Origin:	Indoor Air	▼
Exposure Medium:	Indoor Air	▼
Exposure Area:		▼
Depth:	NA	▼
Duration:		▼

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hours/day	11	
EF	Indoor Air Exposure Frequency	days/yr	250	
ED	Indoor Air Exposure Duration	years	25	
ATc	Indoor Air Averaging Time - Cancer	hours	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hours	219000	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC		URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
	Indoor Air (mg/m3)	RfC (mg/m3)							
1,1,1-Trichloroethane	8.18E-05	5	NA	NA	NA	2.57E-05	0.00001	NA	0.00001
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	ND	NA	0.0000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,2,4-Trimethylbenzene	1.22E-03	0.007	NA	NA	NA	3.84E-04	0.05	NA	0.05
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	2.17E-04	2.4	0.000026	2.43E-05	6E-07	6.80E-05	0.00003	6E-07	0.00003
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	6.80E-05	0.002	0.00003	7.62E-06	2E-07	2.13E-05	0.01	2E-07	0.01
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	1.20E-04	0.8	0.000011	1.35E-05	1E-07	3.77E-05	0.00005	1E-07	0.00005
Benzene	1.94E-03	0.03	0.0000078	2.17E-04	2E-06	6.08E-04	0.02	2E-06	0.02
Bromodichloromethane	1.91E-04	NA	0.000037	2.14E-05	8E-07	NA	NA	8E-07	NA
Bromoform	ND	NA	0.0000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	1.01E-03	0.1	0.000006	1.14E-04	7E-07	3.18E-04	0.003	7E-07	0.003
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	4.24E-03	0.098	0.000023	4.75E-04	1E-05	1.33E-03	0.01	1E-05	0.01
cis-1,2-Dichloroethene	ND	0.035	NA	ND	ND	ND	ND	ND	ND
Ethylbenzene	1.98E-03	1	0.0000025	2.22E-04	6E-07	6.22E-04	0.0006	6E-07	0.0006
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Methylene chloride	3.84E-03	1	0.00000047	4.31E-04	2E-07	1.21E-03	0.001	2E-07	0.001
Methyl tert butyl ether	ND	3	0.00000026	ND	ND	ND	ND	ND	ND
Naphthalene	3.67E-04	0.003	0.000034	4.11E-05	1E-06	1.15E-04	0.04	1E-06	0.04
Tetrachloroethene	1.04E-03	0.27	0.0000059	1.16E-04	7E-07	3.25E-04	0.001	7E-07	0.001
Toluene	1.58E-02	5	NA	NA	NA	4.95E-03	0.001	NA	0.001
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	ND	NA	0.000002	ND	ND	ND	ND	ND	ND
Vinyl chloride	ND	0.1	0.0000044	ND	ND	ND	ND	ND	ND
Xylenes	1.07E-02	0.1	NA	NA	NA	3.35E-03	0.03	NA	0.03
Total					2E-05		0.18	2E-05	0.18

NA - Not available
 NC - Not calculated
 ND - Not detected

Table
 Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air
 UniFirst Corporation
 Child - Long Term
 Indoor Air
 Volatilization from Indoor Air Combined Results
 0
 Sample Location IA-01

Receptor:	Child - Long Term	▼
Medium of Origin:	Indoor Air	▼
Exposure Medium:	Indoor Air	▼
Exposure Area:		▼
Depth:	NA	▼
Duration:		▼

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hours/day	11	
EF	Indoor Air Exposure Frequency	days/yr	250	
ED	Indoor Air Exposure Duration	years	7	
ATc	Indoor Air Averaging Time - Cancer	hours	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hours	61320	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC			ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
	Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)						
1,1,1-Trichloroethane	8.18E-05	5	NA	NA	NA	2.57E-05	0.00001	NA	0.00001
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	ND	NA	0.0000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,2,4-Trimethylbenzene	1.22E-03	0.007	NA	NA	NA	3.84E-04	0.05	NA	0.05
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	2.17E-04	2.4	0.000026	6.80E-06	2E-07	6.80E-05	0.00003	2E-07	0.00003
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	6.80E-05	0.002	0.00003	2.13E-06	6E-08	2.13E-05	0.01	6E-08	0.01
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	1.20E-04	0.8	0.000011	3.77E-06	4E-08	3.77E-05	0.00005	4E-08	0.00005
Benzene	1.94E-03	0.03	0.0000078	6.08E-05	5E-07	6.08E-04	0.02	5E-07	0.02
Bromodichloromethane	1.91E-04	NA	0.000037	6.00E-06	2E-07	NA	NA	2E-07	NA
Bromoform	ND	NA	0.0000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	1.01E-03	0.1	0.000006	3.18E-05	2E-07	3.18E-04	0.003	2E-07	0.003
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	4.24E-03	0.098	0.000023	1.33E-04	3E-06	1.33E-03	0.01	3E-06	0.01
cis-1,2-Dichloroethene	ND	0.035	NA	ND	ND	ND	ND	ND	ND
Ethylbenzene	1.98E-03	1	0.0000025	6.22E-05	2E-07	6.22E-04	0.0006	2E-07	0.0006
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Methylene chloride	3.84E-03	1	0.00000047	1.21E-04	6E-08	1.21E-03	0.001	6E-08	0.001
Methyl tert butyl ether	ND	3	0.00000026	ND	ND	ND	ND	ND	ND
Naphthalene	3.67E-04	0.003	0.000034	1.15E-05	4E-07	1.15E-04	0.04	4E-07	0.04
Tetrachloroethene	1.04E-03	0.27	0.0000059	3.25E-05	2E-07	3.25E-04	0.001	2E-07	0.001
Toluene	1.58E-02	5	NA	NA	NA	4.95E-03	0.001	NA	0.001
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	ND	NA	0.000002	ND	ND	ND	ND	ND	ND
Vinyl chloride	ND	0.1	0.0000044	ND	ND	ND	ND	ND	ND
Xylenes	1.07E-02	0.1	NA	NA	NA	3.35E-03	0.03	NA	0.03
Total					5E-06		0.18	5E-06	0.18

NA - Not available
 NC - Not calculated
 ND - Not detected

Table
 Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air
 UniFirst Corporation
 Resident - Long Term
 Indoor Air
 Volatilization from Indoor Air Combined Results
 0
 Sample Location IA-01

Receptor:	Resident - Long Term	▼
Medium of Origin:	Indoor Air	▼
Exposure Medium:	Indoor Air	▼
Exposure Area:		▼
Depth:	NA	▼
Duration:		▼

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hours/day	24	
EF	Indoor Air Exposure Frequency	days/yr	350	
ED	Indoor Air Exposure Duration	years	30	
ATc	Indoor Air Averaging Time - Cancer	hours	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hours	262800	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC			ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
	Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)						
1,1,1-Trichloroethane	8.18E-05	5	NA	NA	NA	7.84E-05	0.00002	NA	0.00002
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	ND	NA	0.0000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,2,4-Trimethylbenzene	1.22E-03	0.007	NA	NA	NA	1.17E-03	0.2	NA	0.2
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	2.17E-04	2.4	0.000026	8.90E-05	2E-06	2.08E-04	0.00009	2E-06	0.00009
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	6.80E-05	0.002	0.00003	2.79E-05	8E-07	6.52E-05	0.03	8E-07	0.03
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	1.20E-04	0.8	0.000011	4.93E-05	5E-07	1.15E-04	0.0001	5E-07	0.0001
Benzene	1.94E-03	0.03	0.0000078	7.95E-04	6E-06	1.86E-03	0.06	6E-06	0.06
Bromodichloromethane	1.91E-04	NA	0.000037	7.85E-05	3E-06	NA	NA	3E-06	NA
Bromoform	ND	NA	0.0000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	1.01E-03	0.1	0.000006	4.17E-04	3E-06	9.73E-04	0.01	3E-06	0.01
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	4.24E-03	0.098	0.000023	1.74E-03	4E-05	4.07E-03	0.04	4E-05	0.04
cis-1,2-Dichloroethene	ND	0.035	NA	ND	ND	ND	ND	ND	ND
Ethylbenzene	1.98E-03	1	0.0000025	8.14E-04	2E-06	1.90E-03	0.002	2E-06	0.002
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Methylene chloride	3.84E-03	1	0.00000047	1.58E-03	7E-07	3.68E-03	0.004	7E-07	0.004
Methyl tert butyl ether	ND	3	0.00000026	ND	ND	ND	ND	ND	ND
Naphthalene	3.67E-04	0.003	0.000034	1.51E-04	5E-06	3.52E-04	0.1	5E-06	0.1
Tetrachloroethene	1.04E-03	0.27	0.0000059	4.26E-04	3E-06	9.93E-04	0.004	3E-06	0.004
Toluene	1.58E-02	5	NA	NA	NA	1.51E-02	0.003	NA	0.003
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	ND	NA	0.000002	ND	ND	ND	ND	ND	ND
Vinyl chloride	ND	0.1	0.0000044	ND	ND	ND	ND	ND	ND
Xylenes	1.07E-02	0.1	NA	NA	NA	1.02E-02	0.1	NA	0.1
Total					7E-05		0.5	7E-05	0.5

NA - Not available
 NC - Not calculated
 ND - Not detected

Table
 Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air
 UniFirst Corporation
 Child & Worker - Short Term
 Indoor Air
 Volatilization from Indoor Air Combined Results
 0
 Sample Location IA-02

Receptor:	Child & Worker - Short Term	▼
Medium of Origin:	Indoor Air	▼
Exposure Medium:	Indoor Air	▼
Exposure Area:		▼
Depth:	NA	▼
Duration:		▼

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hours/day	11	
EF	Indoor Air Exposure Frequency	days/yr	250	
ED	Indoor Air Exposure Duration	years	5	
ATc	Indoor Air Averaging Time - Cancer	hours	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hours	43800	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC		URF 1/(ug/m3)	ADE-c mg/m3	Risk _{inh}	ADE-nc mg/m3	H _{linh}	Risk (Indoor Air)	HI (Indoor Air)
	Indoor Air (mg/m3)	RfC (mg/m3)							
1,1,1-Trichloroethane	6.81E-05	5	NA	NA	NA	2.14E-05	0.000004	NA	0.000004
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	ND	NA	0.0000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,2,4-Trimethylbenzene	1.40E-03	0.007	NA	NA	NA	4.39E-04	0.06	NA	0.06
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	8.28E-05	2.4	0.000026	1.86E-06	5E-08	2.60E-05	0.00001	5E-08	0.00001
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	7.90E-05	0.002	0.00003	1.77E-06	5E-08	2.48E-05	0.01	5E-08	0.01
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	1.19E-04	0.8	0.000011	2.66E-06	3E-08	3.72E-05	0.00005	3E-08	0.00005
Benzene	1.96E-03	0.03	0.0000078	4.39E-05	3E-07	6.15E-04	0.02	3E-07	0.02
Bromodichloromethane	1.94E-04	NA	0.000037	4.36E-06	2E-07	NA	NA	2E-07	NA
Bromoform	ND	NA	0.0000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	9.45E-04	0.1	0.000006	2.12E-05	1E-07	2.97E-04	0.003	1E-07	0.003
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	4.16E-03	0.098	0.000023	9.33E-05	2E-06	1.31E-03	0.01	2E-06	0.01
cis-1,2-Dichloroethene	ND	0.035	NA	ND	ND	ND	ND	ND	ND
Ethylbenzene	2.08E-03	1	0.0000025	4.66E-05	1E-07	6.53E-04	0.0007	1E-07	0.0007
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Methylene chloride	2.00E-03	1	0.00000047	4.48E-05	2E-08	6.28E-04	0.0006	2E-08	0.0006
Methyl tert butyl ether	ND	3	0.00000026	ND	ND	ND	ND	ND	ND
Naphthalene	3.41E-04	0.003	0.000034	7.64E-06	3E-07	1.07E-04	0.04	3E-07	0.04
Tetrachloroethene	1.19E-03	0.27	0.0000059	2.66E-05	2E-07	3.72E-04	0.001	2E-07	0.001
Toluene	1.69E-02	5	NA	NA	NA	5.30E-03	0.001	NA	0.001
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	ND	NA	0.000002	ND	ND	ND	ND	ND	ND
Vinyl chloride	ND	0.1	0.0000044	ND	ND	ND	ND	ND	ND
Xylenes	1.11E-02	0.1	NA	NA	NA	3.47E-03	0.03	NA	0.03
Total					3E-06		0.19	3E-06	0.2

NA - Not available
 NC - Not calculated
 ND - Not detected

Table
 Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air
 UniFirst Corporation
 Worker - Long Term
 Indoor Air
 Volatilization from Indoor Air Combined Results
 0
 Sample Location IA-02

Receptor:	Worker - Long Term	▼
Medium of Origin:	Indoor Air	▼
Exposure Medium:	Indoor Air	▼
Exposure Area:		▼
Depth:	NA	▼
Duration:		▼

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hours/day	11	
EF	Indoor Air Exposure Frequency	days/yr	250	
ED	Indoor Air Exposure Duration	years	25	
ATc	Indoor Air Averaging Time - Cancer	hours	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hours	219000	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC		URF 1/(ug/m3)	ADE-c mg/m3	Risk _{inh}	ADE-nc mg/m3	H _{linh}	Risk (Indoor Air)	HI (Indoor Air)
	Indoor Air (mg/m3)	RfC (mg/m3)							
1,1,1-Trichloroethane	6.81E-05	5	NA	NA	NA	2.14E-05	0.000004	NA	0.000004
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	ND	NA	0.0000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,2,4-Trimethylbenzene	1.40E-03	0.007	NA	NA	NA	4.39E-04	0.06	NA	0.06
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	8.28E-05	2.4	0.000026	9.28E-06	2E-07	2.60E-05	0.00001	2E-07	0.00001
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	7.90E-05	0.002	0.00003	8.86E-06	3E-07	2.48E-05	0.01	3E-07	0.01
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	1.19E-04	0.8	0.000011	1.33E-05	1E-07	3.72E-05	0.00005	1E-07	0.00005
Benzene	1.96E-03	0.03	0.0000078	2.20E-04	2E-06	6.15E-04	0.02	2E-06	0.02
Bromodichloromethane	1.94E-04	NA	0.000037	2.18E-05	8E-07	NA	NA	8E-07	NA
Bromoform	ND	NA	0.0000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	9.45E-04	0.1	0.000006	1.06E-04	6E-07	2.97E-04	0.003	6E-07	0.003
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	4.16E-03	0.098	0.000023	4.66E-04	1E-05	1.31E-03	0.01	1E-05	0.01
cis-1,2-Dichloroethene	ND	0.035	NA	ND	ND	ND	ND	ND	ND
Ethylbenzene	2.08E-03	1	0.0000025	2.33E-04	6E-07	6.53E-04	0.0007	6E-07	0.0007
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Methylene chloride	2.00E-03	1	0.00000047	2.24E-04	1E-07	6.28E-04	0.0006	1E-07	0.0006
Methyl tert butyl ether	ND	3	0.00000026	ND	ND	ND	ND	ND	ND
Naphthalene	3.41E-04	0.003	0.000034	3.82E-05	1E-06	1.07E-04	0.04	1E-06	0.04
Tetrachloroethene	1.19E-03	0.27	0.0000059	1.33E-04	8E-07	3.72E-04	0.001	8E-07	0.001
Toluene	1.69E-02	5	NA	NA	NA	5.30E-03	0.001	NA	0.001
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	ND	NA	0.000002	ND	ND	ND	ND	ND	ND
Vinyl chloride	ND	0.1	0.0000044	ND	ND	ND	ND	ND	ND
Xylenes	1.11E-02	0.1	NA	NA	NA	3.47E-03	0.03	NA	0.03
Total					2E-05		0.2	2E-05	0.2

NA - Not available
 NC - Not calculated
 ND - Not detected

Table
 Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air
 UniFirst Corporation
 Child - Long Term
 Indoor Air
 Volatilization from Indoor Air Combined Results
 0
 Sample Location IA-02

Receptor:	Child - Long Term	▼
Medium of Origin:	Indoor Air	▼
Exposure Medium:	Indoor Air	▼
Exposure Area:		▼
Depth:	NA	▼
Duration:		▼

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hours/day	11	
EF	Indoor Air Exposure Frequency	days/yr	250	
ED	Indoor Air Exposure Duration	years	7	
ATc	Indoor Air Averaging Time - Cancer	hours	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hours	61320	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC		URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
	Indoor Air (mg/m3)	RfC (mg/m3)							
1,1,1-Trichloroethane	6.81E-05	5	NA	NA	NA	2.14E-05	0.000004	NA	0.000004
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	ND	NA	0.0000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,2,4-Trimethylbenzene	1.40E-03	0.007	NA	NA	NA	4.39E-04	0.06	NA	0.06
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	8.28E-05	2.4	0.000026	2.60E-06	7E-08	2.60E-05	0.00001	7E-08	0.00001
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	7.90E-05	0.002	0.00003	2.48E-06	7E-08	2.48E-05	0.01	7E-08	0.01
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	1.19E-04	0.8	0.000011	3.72E-06	4E-08	3.72E-05	0.00005	4E-08	0.00005
Benzene	1.96E-03	0.03	0.0000078	6.15E-05	5E-07	6.15E-04	0.02	5E-07	0.02
Bromodichloromethane	1.94E-04	NA	0.000037	6.10E-06	2E-07	NA	NA	2E-07	NA
Bromoform	ND	NA	0.0000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	9.45E-04	0.1	0.000006	2.97E-05	2E-07	2.97E-04	0.003	2E-07	0.003
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	4.16E-03	0.098	0.000023	1.31E-04	3E-06	1.31E-03	0.01	3E-06	0.01
cis-1,2-Dichloroethene	ND	0.035	NA	ND	ND	ND	ND	ND	ND
Ethylbenzene	2.08E-03	1	0.0000025	6.53E-05	2E-07	6.53E-04	0.0007	2E-07	0.0007
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Methylene chloride	2.00E-03	1	0.00000047	6.28E-05	3E-08	6.28E-04	0.0006	3E-08	0.0006
Methyl tert butyl ether	ND	3	0.00000026	ND	ND	ND	ND	ND	ND
Naphthalene	3.41E-04	0.003	0.000034	1.07E-05	4E-07	1.07E-04	0.04	4E-07	0.04
Tetrachloroethene	1.19E-03	0.27	0.0000059	3.72E-05	2E-07	3.72E-04	0.001	2E-07	0.001
Toluene	1.69E-02	5	NA	NA	NA	5.30E-03	0.001	NA	0.001
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	ND	NA	0.000002	ND	ND	ND	ND	ND	ND
Vinyl chloride	ND	0.1	0.0000044	ND	ND	ND	ND	ND	ND
Xylenes	1.11E-02	0.1	NA	NA	NA	3.47E-03	0.03	NA	0.03
Total					5E-06		0.2	5E-06	0.2

NA - Not available
 NC - Not calculated
 ND - Not detected

Table
 Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air
 UniFirst Corporation
 Resident - Long Term
 Indoor Air
 Volatilization from Indoor Air Combined Results
 0
 Sample Location IA-02

Receptor:	Resident - Long Term	▼
Medium of Origin:	Indoor Air	▼
Exposure Medium:	Indoor Air	▼
Exposure Area:		▼
Depth:	NA	▼
Duration:		▼

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hours/day	24	
EF	Indoor Air Exposure Frequency	days/yr	350	
ED	Indoor Air Exposure Duration	years	30	
ATc	Indoor Air Averaging Time - Cancer	hours	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hours	262800	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC			ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
	Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)						
1,1,1-Trichloroethane	6.81E-05	5	NA	NA	NA	6.53E-05	0.00001	NA	0.00001
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	ND	NA	0.0000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,2,4-Trimethylbenzene	1.40E-03	0.007	NA	NA	NA	1.34E-03	0.2	NA	0.2
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	8.28E-05	2.4	0.000026	3.40E-05	9E-07	7.93E-05	0.00003	9E-07	0.00003
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	7.90E-05	0.002	0.00003	3.25E-05	1E-06	7.58E-05	0.04	1E-06	0.04
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	1.19E-04	0.8	0.000011	4.87E-05	5E-07	1.14E-04	0.0001	5E-07	0.0001
Benzene	1.96E-03	0.03	0.0000078	8.05E-04	6E-06	1.88E-03	0.06	6E-06	0.06
Bromodichloromethane	1.94E-04	NA	0.000037	7.98E-05	3E-06	NA	NA	3E-06	NA
Bromoform	ND	NA	0.0000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	9.45E-04	0.1	0.000006	3.88E-04	2E-06	9.06E-04	0.01	2E-06	0.01
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	4.16E-03	0.098	0.000023	1.71E-03	4E-05	3.99E-03	0.04	4E-05	0.04
cis-1,2-Dichloroethene	ND	0.035	NA	ND	ND	ND	ND	ND	ND
Ethylbenzene	2.08E-03	1	0.0000025	8.54E-04	2E-06	1.99E-03	0.002	2E-06	0.002
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Methylene chloride	2.00E-03	1	0.00000047	8.22E-04	4E-07	1.92E-03	0.002	4E-07	0.002
Methyl tert butyl ether	ND	3	0.00000026	ND	ND	ND	ND	ND	ND
Naphthalene	3.41E-04	0.003	0.000034	1.40E-04	5E-06	3.27E-04	0.1	5E-06	0.1
Tetrachloroethene	1.19E-03	0.27	0.0000059	4.87E-04	3E-06	1.14E-03	0.004	3E-06	0.004
Toluene	1.69E-02	5	NA	NA	NA	1.62E-02	0.003	NA	0.003
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	ND	NA	0.000002	ND	ND	ND	ND	ND	ND
Vinyl chloride	ND	0.1	0.0000044	ND	ND	ND	ND	ND	ND
Xylenes	1.11E-02	0.1	NA	NA	NA	1.06E-02	0.1	NA	0.1
Total					6E-05		0.6	6E-05	0.6

NA - Not available
 NC - Not calculated
 ND - Not detected

Table
 Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air
 UniFirst Corporation
 Child & Worker - Short Term
 Indoor Air
 Volatilization from Indoor Air Combined Results
 0
 Sample Location IA-03

Receptor:	Child & Worker - Short Term	▼
Medium of Origin:	Indoor Air	▼
Exposure Medium:	Indoor Air	▼
Exposure Area:		▼
Depth:	NA	▼
Duration:		▼

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hours/day	11	
EF	Indoor Air Exposure Frequency	days/yr	250	
ED	Indoor Air Exposure Duration	years	5	
ATc	Indoor Air Averaging Time - Cancer	hours	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hours	43800	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC			ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
	Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)						
1,1,1-Trichloroethane	5.45E-05	5	NA	NA	NA	1.71E-05	0.000003	NA	0.000003
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	ND	NA	0.0000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,2,4-Trimethylbenzene	1.46E-03	0.007	NA	NA	NA	4.59E-04	0.07	NA	0.07
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	2.65E-04	2.4	0.000026	5.94E-06	2E-07	8.32E-05	0.00003	2E-07	0.00003
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	7.50E-05	0.002	0.00003	1.68E-06	5E-08	2.35E-05	0.01	5E-08	0.01
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	1.14E-04	0.8	0.000011	2.56E-06	3E-08	3.58E-05	0.00004	3E-08	0.00004
Benzene	1.91E-03	0.03	0.0000078	4.28E-05	3E-07	5.99E-04	0.02	3E-07	0.02
Bromodichloromethane	1.95E-04	NA	0.000037	4.36E-06	2E-07	NA	NA	2E-07	NA
Bromoform	ND	NA	0.0000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	1.11E-03	0.1	0.000006	2.49E-05	1E-07	3.48E-04	0.003	1E-07	0.003
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	4.82E-03	0.098	0.000023	1.08E-04	2E-06	1.51E-03	0.02	2E-06	0.02
cis-1,2-Dichloroethene	ND	0.035	NA	ND	ND	ND	ND	ND	ND
Ethylbenzene	2.03E-03	1	0.0000025	4.55E-05	1E-07	6.37E-04	0.0006	1E-07	0.0006
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Methylene chloride	2.45E-03	1	0.00000047	5.49E-05	3E-08	7.69E-04	0.0008	3E-08	0.0008
Methyl tert butyl ether	ND	3	0.00000026	ND	ND	ND	ND	ND	ND
Naphthalene	3.67E-04	0.003	0.000034	8.23E-06	3E-07	1.15E-04	0.04	3E-07	0.04
Tetrachloroethene	1.18E-03	0.27	0.0000059	2.65E-05	2E-07	3.70E-04	0.001	2E-07	0.001
Toluene	1.55E-02	5	NA	NA	NA	4.87E-03	0.001	NA	0.001
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	ND	NA	0.000002	ND	ND	ND	ND	ND	ND
Vinyl chloride	ND	0.1	0.0000044	ND	ND	ND	ND	ND	ND
Xylenes	1.09E-02	0.1	NA	NA	NA	3.42E-03	0.03	NA	0.03
Total					4E-06		0.2	4E-06	0.2

NA - Not available
 NC - Not calculated
 ND - Not detected

Table
 Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air
 UniFirst Corporation
 Worker - Long Term
 Indoor Air
 Volatilization from Indoor Air Combined Results
 0
 Sample Location IA-03

Receptor:	Worker - Long Term	▼
Medium of Origin:	Indoor Air	▼
Exposure Medium:	Indoor Air	▼
Exposure Area:		▼
Depth:	NA	▼
Duration:		▼

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hours/day	11	
EF	Indoor Air Exposure Frequency	days/yr	250	
ED	Indoor Air Exposure Duration	years	25	
ATc	Indoor Air Averaging Time - Cancer	hours	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hours	219000	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC			ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
	Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)						
1,1,1-Trichloroethane	5.45E-05	5	NA	NA	NA	1.71E-05	0.000003	NA	0.000003
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	ND	NA	0.0000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,2,4-Trimethylbenzene	1.46E-03	0.007	NA	NA	NA	4.59E-04	0.07	NA	0.07
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	2.65E-04	2.4	0.000026	2.97E-05	8E-07	8.32E-05	0.00003	8E-07	0.00003
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	7.50E-05	0.002	0.00003	8.41E-06	3E-07	2.35E-05	0.01	3E-07	0.01
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	1.14E-04	0.8	0.000011	1.28E-05	1E-07	3.58E-05	0.00004	1E-07	0.00004
Benzene	1.91E-03	0.03	0.0000078	2.14E-04	2E-06	5.99E-04	0.02	2E-06	0.02
Bromodichloromethane	1.95E-04	NA	0.000037	2.18E-05	8E-07	NA	NA	8E-07	NA
Bromoform	ND	NA	0.0000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	1.11E-03	0.1	0.000006	1.24E-04	7E-07	3.48E-04	0.003	7E-07	0.003
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	4.82E-03	0.098	0.000023	5.40E-04	1E-05	1.51E-03	0.02	1E-05	0.02
cis-1,2-Dichloroethene	ND	0.035	NA	ND	ND	ND	ND	ND	ND
Ethylbenzene	2.03E-03	1	0.0000025	2.27E-04	6E-07	6.37E-04	0.0006	6E-07	0.0006
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Methylene chloride	2.45E-03	1	0.00000047	2.75E-04	1E-07	7.69E-04	0.0008	1E-07	0.0008
Methyl tert butyl ether	ND	3	0.00000026	ND	ND	ND	ND	ND	ND
Naphthalene	3.67E-04	0.003	0.000034	4.11E-05	1E-06	1.15E-04	0.04	1E-06	0.04
Tetrachloroethene	1.18E-03	0.27	0.0000059	1.32E-04	8E-07	3.70E-04	0.001	8E-07	0.001
Toluene	1.55E-02	5	NA	NA	NA	4.87E-03	0.001	NA	0.001
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	ND	NA	0.000002	ND	ND	ND	ND	ND	ND
Vinyl chloride	ND	0.1	0.0000044	ND	ND	ND	ND	ND	ND
Xylenes	1.09E-02	0.1	NA	NA	NA	3.42E-03	0.03	NA	0.03
Total					2E-05		0.2	2E-05	0.2

NA - Not available
 NC - Not calculated
 ND - Not detected

Table
 Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air
 UniFirst Corporation
 Child - Long Term
 Indoor Air
 Volatilization from Indoor Air Combined Results
 0
 Sample Location IA-03

Receptor:	Child - Long Term	▼
Medium of Origin:	Indoor Air	▼
Exposure Medium:	Indoor Air	▼
Exposure Area:		▼
Depth:	NA	▼
Duration:		▼

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hours/day	11	
EF	Indoor Air Exposure Frequency	days/yr	250	
ED	Indoor Air Exposure Duration	years	7	
ATc	Indoor Air Averaging Time - Cancer	hours	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hours	61320	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC			ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
	Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)						
1,1,1-Trichloroethane	5.45E-05	5	NA	NA	NA	1.71E-05	0.000003	NA	0.000003
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	ND	NA	0.0000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,2,4-Trimethylbenzene	1.46E-03	0.007	NA	NA	NA	4.59E-04	0.07	NA	0.07
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	2.65E-04	2.4	0.000026	8.32E-06	2E-07	8.32E-05	0.00003	2E-07	0.00003
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	7.50E-05	0.002	0.00003	2.35E-06	7E-08	2.35E-05	0.01	7E-08	0.01
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	1.14E-04	0.8	0.000011	3.58E-06	4E-08	3.58E-05	0.00004	4E-08	0.00004
Benzene	1.91E-03	0.03	0.0000078	5.99E-05	5E-07	5.99E-04	0.02	5E-07	0.02
Bromodichloromethane	1.95E-04	NA	0.000037	6.11E-06	2E-07	NA	NA	2E-07	NA
Bromoform	ND	NA	0.0000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	1.11E-03	0.1	0.000006	3.48E-05	2E-07	3.48E-04	0.003	2E-07	0.003
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	4.82E-03	0.098	0.000023	1.51E-04	3E-06	1.51E-03	0.02	3E-06	0.02
cis-1,2-Dichloroethene	ND	0.035	NA	ND	ND	ND	ND	ND	ND
Ethylbenzene	2.03E-03	1	0.0000025	6.37E-05	2E-07	6.37E-04	0.0006	2E-07	0.0006
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Methylene chloride	2.45E-03	1	0.00000047	7.69E-05	4E-08	7.69E-04	0.0008	4E-08	0.0008
Methyl tert butyl ether	ND	3	0.00000026	ND	ND	ND	ND	ND	ND
Naphthalene	3.67E-04	0.003	0.000034	1.15E-05	4E-07	1.15E-04	0.04	4E-07	0.04
Tetrachloroethene	1.18E-03	0.27	0.0000059	3.70E-05	2E-07	3.70E-04	0.001	2E-07	0.001
Toluene	1.55E-02	5	NA	NA	NA	4.87E-03	0.001	NA	0.001
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	ND	NA	0.000002	ND	ND	ND	ND	ND	ND
Vinyl chloride	ND	0.1	0.0000044	ND	ND	ND	ND	ND	ND
Xylenes	1.09E-02	0.1	NA	NA	NA	3.42E-03	0.03	NA	0.03
Total					6E-06		0.2	6E-06	0.2

NA - Not available
 NC - Not calculated
 ND - Not detected

Table
 Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air
 UniFirst Corporation
 Resident - Long Term
 Indoor Air
 Volatilization from Indoor Air Combined Results
 0
 Sample Location IA-03

Receptor:	Resident - Long Term	▼
Medium of Origin:	Indoor Air	▼
Exposure Medium:	Indoor Air	▼
Exposure Area:		▼
Depth:	NA	▼
Duration:		▼

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hours/day	24	
EF	Indoor Air Exposure Frequency	days/yr	350	
ED	Indoor Air Exposure Duration	years	30	
ATc	Indoor Air Averaging Time - Cancer	hours	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hours	262800	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC			ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
	Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)						
1,1,1-Trichloroethane	5.45E-05	5	NA	NA	NA	5.23E-05	0.00001	NA	0.00001
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	ND	NA	0.0000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,2,4-Trimethylbenzene	1.46E-03	0.007	NA	NA	NA	1.40E-03	0.2	NA	0.2
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	2.65E-04	2.4	0.000026	1.09E-04	3E-06	2.54E-04	0.0001	3E-06	0.0001
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	7.50E-05	0.002	0.00003	3.08E-05	9E-07	7.19E-05	0.04	9E-07	0.04
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	1.14E-04	0.8	0.000011	4.68E-05	5E-07	1.09E-04	0.0001	5E-07	0.0001
Benzene	1.91E-03	0.03	0.0000078	7.84E-04	6E-06	1.83E-03	0.06	6E-06	0.06
Bromodichloromethane	1.95E-04	NA	0.000037	7.99E-05	3E-06	NA	NA	3E-06	NA
Bromoform	ND	NA	0.0000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	1.11E-03	0.1	0.000006	4.56E-04	3E-06	1.06E-03	0.01	3E-06	0.01
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	4.82E-03	0.098	0.000023	1.98E-03	5E-05	4.62E-03	0.05	5E-05	0.05
cis-1,2-Dichloroethene	ND	0.035	NA	ND	ND	ND	ND	ND	ND
Ethylbenzene	2.03E-03	1	0.0000025	8.33E-04	2E-06	1.94E-03	0.002	2E-06	0.002
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Methylene chloride	2.45E-03	1	0.00000047	1.01E-03	5E-07	2.35E-03	0.002	5E-07	0.002
Methyl tert butyl ether	ND	3	0.00000026	ND	ND	ND	ND	ND	ND
Naphthalene	3.67E-04	0.003	0.000034	1.51E-04	5E-06	3.52E-04	0.1	5E-06	0.1
Tetrachloroethene	1.18E-03	0.27	0.0000059	4.85E-04	3E-06	1.13E-03	0.004	3E-06	0.004
Toluene	1.55E-02	5	NA	NA	NA	1.49E-02	0.003	NA	0.003
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	ND	NA	0.000002	ND	ND	ND	ND	ND	ND
Vinyl chloride	ND	0.1	0.0000044	ND	ND	ND	ND	ND	ND
Xylenes	1.09E-02	0.1	NA	NA	NA	1.04E-02	0.1	NA	0.1
Total					7E-05		0.6	7E-05	0.6

NA - Not available
 NC - Not calculated
 ND - Not detected